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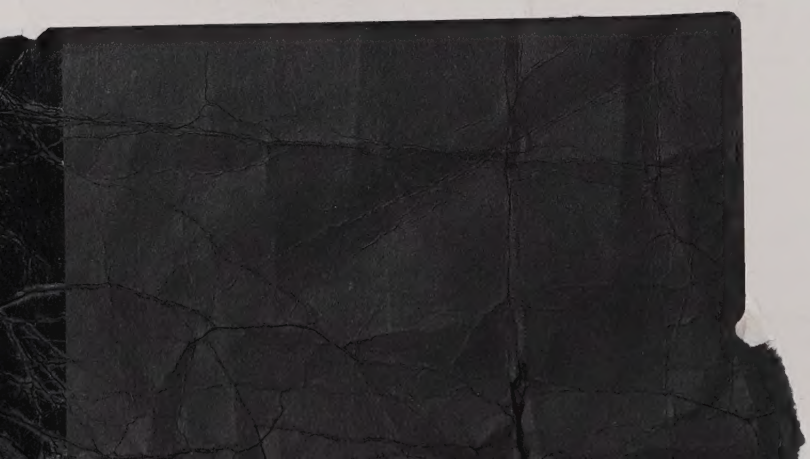

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OPERATING HANDBOOK
FOR KELTEC FLORIDA, INC.
RACK MOUNT
R630 100 AND 200 WATT
TRAVELING WAVE TUBE AMPLIFIERS

AND

R730-100/200
POWER SUPPLY

74A0213

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KELTEC FLORIDA

A DIVISION OF AMSTAR TECHNICAL PRODUCTS COMPANY, INC.

OPERATING HANDBOOK
FOR KELTEC RACK MOUNT
100 AND 200 WATT TWT AMPLIFIERS

SIZE	CODE IDENT NO	
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TABLE OF CONTENTS

		PAGE NO.
1.0	GENERAL	4
1.1	SCOPE	4
1.2	DESCRIPTION	4
1.3	KELTEC FLORIDA WARRANTY	4
2.0	SPECIFICATIONS	7
2.1	RF SPECIFICATIONS	7
2.2	ELECTRICAL SPECIFICATIONS	8
2.3	MECHANICAL SPECIFICATIONS	9
3.0	OPERATING INSTRUCTIONS	10
3.1	INSTALLATION	10
3.2	FRONT PANEL CONTROL AND INDICATOR DESCRIPTION	11
3.3	OPERATING PROCEDURE	12
4.0	THEORY OF OPERATION	14
4.1	GENERAL	14
4.2	POWER SUPPLY BLOCK DIAGRAM DISCUSSION	14
4.3	DEVELOPMENT OF THE HEATER VOLTAGE	17
4.4	DEVELOPMENT OF THE CATHODE VOLTAGE	18
4.5	DEVELOPMENT OF THE COLLECTOR VOLTAGE	20
4.6	CONTROL CIRCUIT OPERATION	21
5.0	TROUBLESHOOTING GUIDE	23
5.1	AMPLIFIER MALFUNCTIONS	23
5.2	POSSIBLE CAUSES OF FAULTS	23
6.0	POWER SUPPLY CALIBRATION	27
6.1	INTRODUCTION	27
6.2	TEST EQUIPMENT REQUIRED	27
6.3	VOLTAGE ADJUSTMENT PROCEDURE	27
7.0	RF RESPONSE CHECK	31
7.1	INTRODUCTION	31
7.2	TEST EQUIPMENT REQUIRED	31
7.3	RF CHECK	31
8.0	IEEE CONTROLLER (OPTIONAL)	33
8.1	GENERAL	33
8.2	STATUS AND TELEMETRY COMMANDS	34
8.3	COMMANDS	35
8.4	OPERATING INSTRUCTIONS	35
8.5	READING DATA	37
8.6	STATUS BYTE	38

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LIST OF TABLES

PAGE NO.

TABLE 1 - TROUBLESHOOTING CHART 39

TABLE 2 - COLLECTOR VOLTAGE AND CATHODE TO HELIX VOLTAGE RANGE SELECTION GUIDE 40

LIST OF FIGURES

FIGURE 1 - REMOTE CONTROL MODULE FOR R630-100/200 AMPLIFIERS 41

FIGURE 2 - POWER SUPPLY BLOCK DIAGRAM 42

FIGURE 3 - LOAD FIXTURE FOR R630-100/200 AMPLIFIERS 43

FIGURE 4 - LOCATION OF ADJUSTMENTS 44

FIGURE 5 - RF TEST CONNECTIONS FOR R630-100/200 AMPLIFIERS 46

FIGURE 6 - SETTING THE IEEE LISTEN ADDRESS 47

LIST OF APPENDICES

APPENDIX A - POWER SUPPLY ACCEPTANCE TEST DATA SHEET AND RF RESPONSE DATA SHEET FOR TRAVELING WAVE TUBE AMPLIFIER A1

APPENDIX B - DRAWINGS AND SCHEMATICS B1

APPENDIX C - TEST DATA SHEET C1

1.0 GENERAL

1.1 SCOPE

This handbook includes the specifications, proper operating procedures, circuit theory, fault isolation techniques, and calibration procedures for the Keltec Florida100 watt and 200 watt, continuous wave, traveling wave tube rack mount amplifiers.

1.2 DESCRIPTION

The Keltec 100 watt and 200 watt continuous wave traveling wave tube amplifier series deliver a minimum of 100 or 200 watts of RF power over the L, S, C, X, IJ and KU frequency bands (1.0 to 18.0GHz). The amplifier is designed for laboratory applications, data-link transmissions, or in any ground based communications system. The unit fits in a standard 19-inch rack in a space 12-1/4 inches high and 25 inches deep. Twenty-four inch chassis slides are provided.

The power supply used in this amplifier is adaptable to almost any 100, 200 or 300 watt traveling wave tube simply by making the necessary adjustments. The supply has a cathode to helix voltage range of -2,700 to -10,300vdc, and a collector voltage range of 2,750 to 5,000vdc. The unit utilizes solid state devices and features delayed high voltage turn-on, controlled turn-on and turn-off sequencing and protection circuitry for fail-safe operation.

The unit is forced air cooled with inlets at the front and rear and an exhaust outlet at the rear of the amplifier. Prime power required by the amplifier is 115 or 230VAC, 47 to 65Hz, single phase, 2,000 watts maximum.

1.3 KELTEC FLORIDA WARRANTY

The products delivered hereunder, except for traveling wave tubes, are warranted by Keltec Florida, Inc. ("Keltec") for the term of this warranty to be free of defects in material and workmanship and to conform to all technical specifications, drawings or samples mutually agreed to in writing by Keltec and Buyer, subject to the limitations contained herein. The term of this warranty is twelve (12) months after the date of shipment by Keltec to Buyer, except for traveling wave tubes. Traveling wave tubes are warranted by the manufacturer and such warranty as is issued to Keltec will be extended to the user of Keltec traveling wave tube amplifiers. For details of the traveling wave tube warranty, see Attachments A, B, or C.

If the product fails to function or malfunctions during the term of this warranty as a result of defect in material and workmanship, Keltec will repair the product at its plant or replace the product, at its sole option, provided that Buyer has notified Keltec in writing during the term of this warranty of a claim hereunder and has returned the product to Keltec's plant

within thirty (30) calendar days after discovery of the claimed defect or non-conformity. Keltec will not be responsible for any costs of removal or reinstallation of the product.

This warranty does not cover the following:

a. Any product which has been modified, altered, or repaired other than by Keltec or its authorized representative;

b. Any product which has been subjected to improper installation, maintenance, overhaul, operation, environment or storage not in accordance with instructions or specifications of Keltec;

c. Any product which has been damaged as a result of misuse, negligence, neglect, or shipping; and

d. Any product to which damage is attributable to any part not supplied or approved by Keltec.

The obligations of Keltec under this warranty are expressly conditioned on Buyer's maintaining of records kept in the ordinary course of business accurately reflecting maintenance performed and the complete nature of any unsatisfactory condition. Buyer shall make such records fully available to Keltec in the event of a warranty claim. Keltec reserves the right to make the final decision as to the existence and nature of any defect in the product to conform to specifications, and the applicability and interpretation of this warranty. Keltec reserves the right to replace any defective product or part thereof with a reasonably similar product or part which will conform to all applicable specifications in the event that original materials are no longer available. Keltec further reserves the right to make changes in any of its products without obligation to incorporate any such change in the product covered by this warranty.

KELTEC MAKES NO OTHER EXPRESS WARRANTY OF ANY KIND WHATSOEVER. ALL IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED AND EXCLUDED FROM THIS WARRANTY. KELTEC DISCLAIMS ALL LIABILITY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR IN CONNECTION WITH, ANY PRODUCT COVERED BY THIS WARRANTY.

In the event of the malfunction of the product covered by this warranty, Buyer shall promptly notify Keltec in writing, setting forth the serial number of the product and all available specific data relating to its malfunction, including the number of actual operating hours. No product may be returned to Keltec

without express written authorization from Keltec. Buyer shall ship the product, freight and insurance prepaid, to Keltec. Any product returned without authorization may, at Keltec's option, be refused and may be returned, freight collect to Buyer. If Keltec's inspection discloses a valid warranty claim requiring repair or replacement, Keltec will assume the cost of return shipping charges to Buyer, not to exceed normal surface shipping charges within the continental United States.

Buyer shall not debit Keltec for products returned under this warranty without prior written authorization from Keltec. Such unauthorized debits shall be subject to a surcharge equal to Keltec's own G&A burden at the time of return of the product to Buyer.

This warranty shall survive acceptance and shall inure to the benefit of Buyer, its successors, assigns and customers. This warranty may not be modified, amended or extended unless in writing and signed by a duly authorized representative of Keltec.

2.0 SPECIFICATIONS

2.1 RF SPECIFICATIONS

FREQUENCY RANGE:

MODEL NO.	BAND	FREQUENCY
LR630-100	L	1.0 TO 2.0GHZ
LR630-200	L	1.0 TO 2.0GHZ
SR630-100	S	2.0 TO 4.0GHZ
SR630-200	S	2.0 TO 4.0GHZ
SCR630-200	SC	2.6 TO 5.2GHZ
CR630-100	C	4.0 TO 8.0GHZ
CR630-200	C	4.0 TO 8.0GHZ
XR630-100	X	8.0 TO 12.4GHZ
XR630-200	X	8.0 TO 12.4GHZ
KUR630-100	KU	12.4 TO 18.0GHZ
KUR630-100	KU	12.4 TO 18.0GHZ
IJR630-200	IJ	8.0 TO 18.0GHZ

SATURATED POWER OUTPUT (MINIMUM) 100 WATT UNITS +50dBm
200 WATT UNITS +53dBm

See RF response data sheet in Appendix A.

GAIN AT RATED POWER:

100 WATT UNITS		200 WATT UNITS	
L BAND	30db	L BAND	30db
S BAND	40db	S BAND	40db
C BAND	40db	SC BAND	45db
X BAND	40db	C BAND	37db
KU BAND	37db	X BAND	35db
		KU BAND	35db
		IJ BAND	30db

See RF response data sheet in Appendix A for specific values.

MAXIMUM NOISE FIGURE	35db
INPUT VSWR (MAXIMUM)	3.0:1
OUTPUT VSWR (MAXIMUM)	2.0:1

For specified RF performance, an output VSWR of 1.5:1 should not be exceeded. An adjustable VSWR overload circuit is optional per customer specifications.

IMPEDANCE (INPUT AND OUTPUT)	50 OHMS
CONNECTORS	
RF INPUT	TYPE N FEMALE
RF OUTPUT	TYPE N FEMALE

On X, IJ and KU bands, RF output is a waveguide extending from the rear of the amplifier. Any optional connector style is available per customer specifications.

2.2 ELECTRICAL SPECIFICATIONS

2.2.1 INPUT POWER

PRIME INPUT POWER	115VAC ±10% OR 230VAC ±10% 47-65GHZ, SINGLE PHASE	
POWER CONSUMPTION	2,000 WATTS MAXIMUM	
CIRCUIT BREAKERS:	LOW VOLTAGE	3 AMPS FOR 115VAC 3 AMPS FOR 230VAC
	HIGH VOLTAGE	30 AMPS FOR 115VAC 15 AMPS FOR 230VAC
CONNECTOR TYPE	P/N 3434 BY ARROW-HART	
*MATING CONNECTOR	P/N 3433 BY ARROW-HART	

INPUT POWER CONNECTOR, J1

PIN	
W	SAFETY GROUND (CHASSIS)
X	230VAC (ONE SIDE)
Y	POWER NEUTRAL
Z	115VAC OR 230VAC (ONE SIDE)

NOTE - Do not use two phases of 115/208VAC, three phase power for the 230VAC input. One phase may be used for the 115VAC input only.

2.2.2 REMOTE CONTROL INPUT

CONNECTOR TYPE	P/N DBM-25S, ITT CANNON
*MATING CONNECTOR	P/N DBM-25P, ITT CANNON

See paragraph 3.1.1 and Figure 1 for further remote control details.

NOTE - *Mating connectors standard with the unit.

2.2.3 PROTECT CIRCUITRY

TWT thermal overload (connections on chassis TB1-2 and -3).

Helix current overload (adjustable by R17 on the control circuit board).

Chassis interlock (high voltage cutoff when top or bottom panel removed).

VSWR overload (optional).

Input is 200mV to 5VDC on remote connector, J2, pin 21 to 22 (GND) adjustable by R1 on the control circuit board.

2.3 MECHANICAL SPECIFICATIONS

SHAPE	RECTANGULAR - 19 INCH RACK MOUNT
DIMENSIONS	(SEE OUTLINE DRAWING)
HEIGHT	12.22 INCHES
WIDTH	19.00 INCHES
DEPTH	24.00 INCHES
WEIGHT:	POWER SUPPLY ONLY - 180 POUNDS AMPLIFIER (TWT INCL) - 200 POUNDS
COOLING	INTEGRAL FORCED AIR
OPERATING ENVIRONMENT:	
ALTITUDE	SEA LEVEL TO 10,000 FEET
TEMPERATURE	O TO 50°C
MOUNTING POSITION	STANDARD 19 INCH RACK WITH CHASSIS SIDES, 24 INCH LENGTH
FINISH	FRONT PANEL - PAINT (FAWN-BEIGE) SIDE PANEL - ANODIZED ALUMINUM OTHER METAL PARTS - ALODINED

3.0 OPERATING INSTRUCTIONS

3.1 INSTALLATION

The amplifier mounts in a standard 19 inch rack. Twenty-four inch chassis slides are provided so the amplifier can be pulled out for cleaning and maintenance. The slides bolt directly to the rack at the rear of the amplifier through the angle brackets provided. The flange on the front of each chassis slide is also bolted directly to the rack. The amplifier can then be slid into the rack and the front panel secured. The rack should be positioned so that there is ample room for airflow at the rear of the amplifier.

Connection of prime power to the amplifier is made at the rear panel with connections as described in paragraph 2.2.1. Connect a 50 ohm load to the RF OUT connector and an RF source to the RF IN connector. Maximum RF load VSWR allowable for safe operation of the amplifier is specified in paragraph 2.1. Care should be exercised not to overdrive the tube. Maximum RF drive should be limited to approximately 6dB above that required to saturate the tube.

WARNING
OPERATING HAZARD
MICROWAVE RADIATION

Exposure of the human body to microwave radiation in excess of one (1) milliwatt per square centimeter is unsafe and can result in blindness or other injury. Personnel must be fully protected from the microwave energy which radiates from this device. All input and output R-F connections, waveguide flanges, and gaskets must be R-F leakproof and properly engaged. Never operate this device without a microwave-energy-absorbing load attached. Personnel must be prevented from looking into open waveguides or antennas while such a device is energized.

(REF: PROC. IRE, VOL. 49, NO. 2, pp. 427-447, FEB., 1961)

3.1.1 INSTALLATION FOR REMOTE OPERATION

Remote operation is possible using a remote module as shown in Figure 1. The module parallels all front panel controls and indicators, and is connected to the amplifier back panel at the remote input connector. The remote module has an additional remote indicator which is lighted when the remote station is activated by placing the amplifier mode switch in the remote position.

An optional IEEE 488 remote will allow the unit to be controlled across the IEEE 488 standard bus. See section 8 for further information.

3.2 FRONT PANEL CONTROL AND INDICATOR DESCRIPTION

MODE CONTROL SWITCH:

OFF — No power is being applied to the unit.

STANDBY — Only filament and anode voltages are applied to the TWT.

OPERATE — After the time delay, TWT high voltage comes on allowing the amplifier to operate.

REMOTE — This transfers OFF/STANDBY/OPERATE control from the unit through the J2 remote connector to a remote station (or to the optional IEEE 488 bus).

CIRCUIT BREAKERS:

Three main circuit breakers protect the low voltage and high voltage circuitry as follows (only two are in use at any given time): the circuit breaker for the low voltage circuitry is rated at 3 amperes and is used when operating from either a 115 or 230 volt primary input. The high voltage circuitry is protected by one or two circuit breakers depending upon the primary input voltage being used. For 115 volt operation, a single 30A circuit breaker is used to protect the high voltage circuitry. For 230 volt operation, the same 30A circuit breaker is used and, in addition, a 15A circuit breaker is also used.

HELIX CURRENT METER: Indicates TWT helix current from 0 to 100mA.

INDICATORS:

TIME DELAY — Turns on as soon as prime power is turned ON. Turns OFF when the three minute time delay has elapsed. Indicates TWT filament warm-up.

STANDBY — Turns on after three minute time delay has elapsed only if unit is in the standby mode. Turns off when unit is placed in operate or off. Indicates unit is ready for operation.

OPERATE — Turns on when unit is placed in the operate mode.

CURRENT OVERLOAD — Indicates when TWT helix current has exceeded its maximum safe operating limit. The overload must be manually reset by placing the unit in standby and returning it to operate. Overcurrent trip is factory set per specific TWT requirements. See section 6.0 for proper overload adjustment.

THERMAL OVERLOAD — Indicates when the maximum safe overload operating temperature of the amplifier traveling wave tube has been exceeded. The overload removes high voltage allowing TWT filament and unit fan to operate. Unit will reset to operate automatically after amplifier has cooled. The normally closed TWT thermal switch connects on chassis terminal board, TB1-2 and -3.

VSWR OVERLOAD (OPT.) — Indicates when an excessive voltage standing wave is being reflected back into the TWT RF output. The overload removes high voltage. The unit must be reset by placing it in standby and returning it to operate. Optional VSWR overload indicator is on front panel and on J2 remote connector pin 14 to pin 10. The VSWR input is 200mV to 5VDC on J2 remote connector pin 21 to 22 (GND).

3.3 OPERATING PROCEDURE

When the proper power and RF connections have been made, the unit is ready for operation.

3.3.1 POWER TURN-ON

Turn the mode control from OFF to STANDBY. The yellow TIME DELAY indicator will light, filament voltage will be applied to the TWT and the three minute time delay will start.

3.3.2 TIME DELAY

The filament is given time to heat before the TWT high voltage is applied. This preheating prolongs the life of the cathode. After approximately three minutes of filament heating, the yellow TIME DELAY indicator will go out and the green STANDBY indicator will light, signifying that high voltage can be applied to the TWT.

3.3.3 OPERATE

Turn the mode control from STANDBY to OPERATE. This will apply high voltage to the TWT. The green STANDBY indicator will go out and the blue OPERATE indicator will light. The helix current meter will register the helix current. The amplifier is then ready for RF operation.

NOTE - To prevent the TWT from becoming gassy, the amplifier should be placed in full operation for at least one hour every six months.

3.3.4 TURN-OFF

When turning off the amplifier, place the amplifier in STANDBY for a few minutes to allow the TWT to cool. This procedure will extend tube life.

CAUTION - Placing the unit from STANDBY to OPERATE to STANDBY to OPERATE in rapid succession (less than 3 second intervals) can be detrimental to both the power supply and the traveling wave tube.

4.0 THEORY OF OPERATION

4.1 GENERAL

The theory of operation section is divided into two parts. The power supply block diagram discussion is given first. It is followed by a more detailed circuit description.

To avoid ambiguity in referring to individual components, the power supply has been divided into six modules. Each module has been assigned a number prefixed with the letter "A", as follows:

MODULE	DESCRIPTION
A1	Chassis
A2	High Voltage
A3	Heat Sink
A4	Control Circuit
A5	Helix-Heater Regulator
A6	Low Voltage Power Module

A component reference designation will be prefixed by its module code. Example: A3R1--Resistor R1 on the Heat Sink.

4.2 POWER SUPPLY BLOCK DIAGRAM DISCUSSION

The electrical operation of the power supply can be subdivided into functional blocks as shown in Figure 2. Each block contains a component or group of components connected to perform the specific electrical function labeled on that block. Figure 2 shows the required interconnection of the blocks to perform the complete electrical function of the power supply.

The function of the power supply is to provide controlled filament, helix and collector voltages to a high power traveling wave tube. Indicators are also provided to display the state of the power supply to the operator.

In the power supply, there is a low voltage power channel for the heater output and a high voltage power channel for the helix and collector outputs. The low voltage power is controlled by circuit breaker 1 and switch S1A and S1B. The high voltage power is controlled by circuit breaker 2 and the power relay. The power relay is operated by the control circuit. The control circuit translates front panel (or remote) switch positions and overload signals from the power supply circuits into electrical commands for the power supply circuits and indicator signals for the front panel (or remote) indicators.

4.2.1 LOW POWER CHANNEL (HEATER SUPPLY)

Input power from the main power plug, J1, flows through circuit breaker 1 to switch S1A and S1E if the circuit breaker is closed. When S1 is in standby or operate, the input power is connected to the time delay relay, the blower, and to input converter No. 1. The time delay relay generates a signal after three minutes of operation, which is fed to the control circuit. The control circuit inhibits the high voltage power channel until it receives the signal from the relay. This allows the heater of the TWT to warm up before high voltage is applied, regardless of front panel switch positions. Input converter No. 1 contains a step-down transformer, rectifier, and filter to convert the 115VAC (or 230VAC) power into 28VDC for the heater regulator.

The heater regulator is self-starting, and it changes the 28VDC from the input converter to a regulated 23VDC which is used to supply several other circuits, including the magnetic multivibrator and heater inverter. The next state in the low voltage channel is the magnetic multivibrator. It is a self-starting 4KHz square wave oscillator which chops the 23VDC power and steps it down to 8V p-p base drive for the heater inverter switching transistors. The heater inverter also chops the 23VDC from the heater regulator and provides 6.3V RMS square wave heater power for the TWT. The 6.3V RMS output is referenced (floated) to the cathode output. This heater power is applied to the TWT as soon as circuit breaker 1 is closed and S1 (or remote S1) is switched from the OFF position.

4.2.2 HIGH VOLTAGE POWER CHANNEL (HELIX AND COLLECTOR) (SINGLE COLLECTOR; L, S, C AND X BANDS)

The high voltage power channel has two sections, one is the collector supply. All power for these circuits is controlled by circuit breaker 2 and the power relay. When the operator closes circuit breaker 2 and the control circuit closes the power relay, the collector transformer is connected to the input power. At the collector transformer, the collector power and the helix power separate.

The collector power is supplied from a high voltage secondary of the collector transformer and is rectified and filtered. The resulting high voltage DC is applied between the collector and cathode of the TWT.

The helix power supplied by the low voltage secondary of the collector transformer is supplied to the helix DC to DC converter where it is chopped, regulated, and transformed to high voltage and then rectified. The rectified high voltage is filtered and surge limited and then applied between the cathode and helix of the TWT. The helix voltage applied to the TWT is tightly regulated because the DC to DC converter base drive is controlled through the helix regulator. The helix regulator receives a feedback signal from the cathode output and compares it with an internal reference to generate an error signal for the helix

converter base drive controller. The controller then adjusts the base drive input to the converter so that the desired output is maintained.

4.2.3 HIGH VOLTAGE POWER CHANNEL (HELIX AND COLLECTOR) (DUAL COLLECTOR; IJ & KU BANDS)

The high voltage power channel has two sections, one is the collector supply. All power for these circuits is controlled by circuit breaker 2 and the power relay. When the operator closes circuit breaker 2 and the control circuit closes the power relay the collector transformer is connected to the input power. At the collector transformer the collector power and the helix power separate.

The collector power is supplied from two high voltage secondaries of the collector transformer and is rectified and filtered. One of the resulting high voltage DC outputs is applied between the collector 1 and cathode of the TWT and the other is applied between collector 2 and the cathode of the TWT.

The helix power supplied by the low voltage secondary of the collector transformer is supplied to the helix DC to DC converter where it is chopped, regulated, and transformer to high voltage and then rectified. The rectified high voltage is filtered and surge limited and then applied between the cathode and helix of the TWT. The helix voltage applied to the TWT is tightly regulated because the DC to DC converter base drive is controlled through the helix regulator. The helix regulator receives a feedback signal from the cathode output and compares it with an internal reference to generate an error signal for the helix converter base drive controller. The controller then adjusts the base drive input to the converter so that the desired output is maintained.

4.2.4 CONTROL CIRCUIT

The inputs to the control circuit are the front panel (or remote) switch positions, overload signals, time delay relay signal, and DC power from the heater regulator. The main function of the control circuit is to operate the power relay in order to control the generation of high voltage. A secondary function is to generate indicator signals for displaying the operation state of the power supply. The circuit indications are:

A. Time Delay (Warm-up).
B. Standby.
C. Operate.
D. Overload.

The overload state is distinguished as to the type of overload which has occurred: either thermal, helix current or VSWR. VSWR indication is optional, although all of the circuit components, except the lamp, are in place . All of the functions of the control circuit can be obtained at a remote location by proper connections to J2.

The following sections will discuss circuit operation within the various blocks of Figure 2. In order to maintain an understanding of the circuit function in relation to the overall power supply operation frequent reference to Figure 2 will be necessary.

4.3 DEVELOPMENT OF THE HEATER VOLTAGE

The circuits which develop the heater voltage are in the top line of blocks in Figure 2. These blocks comprise the low voltage power channel discussed in section 4.1.

Power for the low voltage power channel enters the power supply though the main power input, J1, and flows through circuit breaker 1 (3A rating). From the circuit breaker it flows to switch S1A and S1B, located on the front panel. If S1 is not in the "OFF" position, the power continues to input converter No. 1, the time delay relay, and the blower motor. The time delay is initiated at this time and the blower is energized also.

Input converter No.1 is an AC to DC converter consisting of a step-down transformer, A6T1, a bridge rectifier A6CR1 and a filter capacitor, A6C1. This assembly converts the 115VAC to 28VDC for the heater regulator. The elapsed time meter, A1M2, operates from this 28VDC bus.

The heater regulator is started by current through diode A5CR1. Current flows through the diode through A5R2 and into the base of A5Q1. The transistor amplifies the current and turns on A3Q10 and A3Q9, the pass transistor for the heater regulator. As they turn on, the heater bus voltage at the center tap of A5T1 rises. As the heater bus voltage rises, current flows through A5R8 to the base of A5Q3 (or A5Q4) and initiates switching action in the magnetic multivibrator. When the bus voltage reaches 23VDC, the voltage at the base of A5Q2 has increased to sufficiently turn on A5Q2 and the collector current of A5Q2 prevents further increase in the voltage at the base of A5Q1. Since the voltage at the base of A5Q1 is stabilized, the heater bus voltage at the emitter of A3Q9 is also stabilized and remains at 23VDC.

The bus voltage can be adjusted by A5R24 if the filament voltage output of the power supply is not correct. This adjustment procedure is covered in the calibration section.

The multivibrator consists of switch transistors A5Q3, A5Q4, and transformer A5T1 and associated components. The saturation of A5T1 sets the switching frequency at 4kHz although it will vary if the heater bus voltage is adjusted away from 23VDC. The voltage on the collectors of A5Q3 and A5Q4 is a 46V p-p square

wave at 4kHz. The voltage at the cathode of A5CR2 and A5CR3 is 46VDC. This voltage reference biases A5CR1 and furnishes the supply for A5R1 and A5R2.

The following components not already mentioned perform the following functions:

A5CR8 is the reference for the regulator. It is a 9V zener diode. Its zener voltage is compared with the voltage at the tap of A5R24 by A5Q1. The difference voltage controls the heater bus voltage.

A5CR4 - CR7 limits the voltage drop across the base emitter junctions of the heater pass transistors and A3R17 and, hence, the maximum current that can be applied by the heater bus is limited. The purpose of this feature is to limit the current supplied to a cold (low resistance) filament.

A5C1 stabilizes the regulator with negative AC feedback.

A5R4 supplies "keep alive" current to A5CR8.

A5R6 and R7 limit the base current to the switching transistors.

A5CR9 provides temperature compensation for the heater regulator.

A5CR10 provides a low impedance source for switching transistor base current and references the center tap of the base drive winding of A5T1 to ground.

The heater bus supplies current to the heater inverter, the helix regulator and the control circuit.

The heater inverter consists of A2T3, A3Q12, A3Q13, and associated components. The two transistors are driven by a secondary of A5T1 which delivers an 8V p-p square wave at 4kHz. Base drive current is limited by A3R19 and R20. The transistors chop the voltage supplied by the heater bus and the chopped voltage is transformed into two outputs by A2T3. One output is the 6.3V RMS heater voltage. Another output is the base drive voltage (8V p-p) for the helix DC to DC converter.. A3CR1 and CR2 are 120V zener diodes which protect the switching transistor from reflected transient voltage. The heater inverter is the last electrical function in the low voltage power channel and the last step in the development of the heater voltage.

4.4 DEVELOPMENT OF THE CATHODE VOLTAGE

The cathode voltage is developed by a DC to DC converter. The cathode voltage is the highest voltage in the power supply; however, the power available from the cathode supply is considerably less than that available from the collector supply. The cathode voltage is negative with respect to ground and tightly regulated. The cathode voltage is also adjustable and the cathode supply is protected electronically from overloads such as those caused by TWT arcs.

Power for the cathode supply flows from the input connector through circuit breaker 2 to the power relay. When the power relay is closed by the control circuit, the power continues to

the primary of the collector transformer, A1T1. The transformer steps down the AC line voltage at a ratio determined by the tap selected on A1T1. The output of the transformer is full wave rectified by A6CR2 and filtered by a choke input filter, A1L2 and A6C2. The output of the filter is approximately 65VDC.

Provision is made for discharging A6C2 when the cathode supply is shutdown. To accomplish the discharge, a contact of the power relay connects A1R2 across A6C2 as a bleeder. Discharge is automatic every time high voltage is shutdown. The output of the filter is unregulated and it is used as the main supply to the cathode DC to DC converter.

With reference to Figure 2, the cathode supply consists of five blocks: the helix regulator, the helix converter control, the helix DC to DC converter, the high voltage filter and surge limit, and the helix current overload. The helix regulator compares the feedback voltage from the high voltage filter with the desired helix voltage and reference voltage. It generates an error current based on the difference detected. The error current is amplified in the helix converter control and used to control the base current to the converter switching transistors. The converter output varies with the control current received and thus the high voltage changes in response to the regulator error current output. The regulation is plus or minus one percent (±1%) or better for line and load changes.

The regulator consists of A5Q5 and A5Q7, A5CR13, CR14 and associated resistors. A5CR14 is the 9V reference for the regulator. A5Q5 compares this reference voltage with the feedback received from A5R17 at the desired ratio set by A5R16. Normally, A5Q5 is balanced with equal collector currents in the "A" and "B" sides. If the output voltage of the cathode supply changes or if the operator adjusts A5R16, then A5Q5 will unbalance. A difference current will flow in A5R15 and A5Q7 base. Consequently, A5Q7 collector current will change and this change will be felt by the helix converter control A5Q6 and A3Q14. The helix DC to DC converter base input will change and, hence, the converter output will change. The output change will be sensed in the feedback circuit and A5Q5 will return to the balanced condition at the desired cathode output voltage.

The helix base drive converter control is a two stage darlington current amplifier. It adjusts the DC current level of the 8V p-p square wave from the heater inverter. This square wave drives the bases of the helix DC to DC converter. As the current from the control circuit changes, on command from the regulator, more or less current from the 8V supply is available for the bases of the converter, depending on the signal from the controller.

The helix DC to DC converter consists of eight power switching transistors, A3Q1 - Q8, transformers A2T1 and A2T2 and two high voltage bridge rectifiers. The switching transistors chop the 65VDC bus at a 4kHz rate. The resulting square wave on

the transistor collectors is transformed to high voltage and rectified. The transistors operate in pairs. Two transistors switch each side of the primary of each transformer. The transistors do not saturate and the degree to which they conduct is determined by the current output of the helix base drive controller. Each set of two pairs of transistors operate in synchronism. The collector voltage on each transistor is approximately a 130V p-p square wave.

The outputs of the two bridge rectifiers are added to develop the full cathode voltage. This reduces the stress on individual components. The high voltage filter and surge limit is a capacitor filter with series resistance to limit the peak rate of capacitor discharge. The feedback resistor network is also in this section which is encapsulated. The feedback network also serves as a bleeder to discharge the high voltage capacitors at shutdown.

The negative output of the helix supply is connected to the cathode output. The positive side of the supply is grounded through a series resistor and connected to the TWT helix. The current in the helix is proportional to the voltage dropped across the series resistor. When the helix current exceeds a predetermined maximum value, the helix overload circuit shuts down the helix supply by grounding the input to the helix base drive controller. When this occurs, A3Q14 turns off and no base current is furnished to the DC to DC converter switching transistors. Therefore, the cathode voltage drops to zero. The current at which the overload trips is adjustable by varying A4R17. The overload circuit can be reset by switching from operate to standby and back.

4.5 DEVELOPMENT OF THE COLLECTOR VOLTAGE

4.5.1 SINGLE COLLECTOR SUPPLIES (L, S, C & X BANDS)

The collector voltage is developed in the high voltage power channel discussed in section 4.2 Prime power for the collector supply is applied to the high voltage circuits through circuit breaker 2 and the power relay. When the circuit breaker is closed, prime power to the circuit is controlled by the power relay. The relay is operated by the control circuit. When the relay is closed, the power enters the primary of the collector transformer, A1T1.

The collector transformer steps up the AC line voltage to the proper collector voltage. This voltage is determined by the primary taps selected. The high AC voltage is rectified by A1CR1 - CR4, connected as a full wave bridge. The output of the rectifier is filtered by a choke input LC filter, A1L1 and A1C1. A1R1 is a 13.5 Mohm bleeder resistor connected across the filter output.

The positive terminal of the collector supply output is connected to the TWT collector. The negative terminal is

connected to the TWT cathode. The collector voltage is unregulated and capable of delivering high beam currents. Both terminals of the collector supply are insulated for full cathode voltage. The collector voltage is clamped at a maximum of 2000V with respect to ground for the condition of no cathode voltage.

CAUTION - At no time should the collector supply be operated without the proper load at its output. Operation of the unit with the collector output unloaded may result in premature unit failure and void the warranty.

4.5.2 DUAL COLLECTOR SUPPLIES (IJ AND KU BANDS)

The collector voltage is developed in the high voltage power channel discussed in section 4.2 Prime power for the collector supply is applied to the high voltage circuits through circuit breaker 2 and the power relay. When the circuit breaker is closed, prime power to the circuit is controlled by the power relay. The relay is operated by the control circuit. When the relay is closed, the power enters the primary of the collector transformer, A1T1.

The collector transformer steps up the AC line voltage to the proper collector voltage. This voltage is determined by the primary taps selected. The high AC voltages are rectified by A1CR1 and CR3 connected as a full wave bridge. The output of rectifier, CR1, is filtered by a choke input LC filter, A1L1 and A1C1. A1R2 is a 13.5 Mohm bleeder resistor connected across the filter output. This develops collector 1. The output of rectifier CR3 is filtered by a choke input LC filter, A1L1 and A1C2. A1R11 is a 13.5 Mohm bleeder resistor connected across the filter output. This develops collector 2.

The positive terminals of the collector supply outputs are connected to the TWT collectors. The negative terminals are connected to the TWT cathode. The collector voltages are unregulated and capable of delivering high beam currents. All terminals of the collector supplies are insulated for full cathode voltage. The collector voltages are clamped at a maximum of 2000V with respect to ground for the condition of no cathode voltage.

CAUTION - At no time should the collector supply be operated without the proper load at its output. Operation of the unit with the collector output unloaded may result in premature unit failure and void the warranty.

4.6 CONTROL CIRCUIT OPERATION

The control circuit operates the power relay and provides power supply status indications. The inputs to the control circuit are 23VDC from the front panel, overload signals from the power supply and the time delay relay output.

The state of the power relay is determined by the voltage on the bus which is connected to A3Q11 base. If this bus is 20VDC, the relay will be closed but, if the bus is low, the relay will be open and high voltage outputs will be inhibited. Any one of the following conditions will make the bus low:

A. Time delay in progress
B. S1 in standby
C. Helix overload
D. Thermal overload
E. VSWR overload (optional)

When S1 is switched to standby from off, relay A6K1 will begin timing and A4Q5 will be on. The time delay light, DS5, on the front panel will be lighted. At the end of three minutes, A6K1 contacts 1 and 3 will close to turn off A4Q5 and turn on A5Q4. The time delay lamp, DS5, will extinguish and the standby lamp, DS4, will light. The power supply can now be switched to operate.

When S1 is switched to operate, the standby light will extinguish and the operate lamp will light, indicating that high voltage is being generated. At this time, A1K1 will be closed and the voltage at the base of A3Q11 will be 20VDC.

If a helix overload occurs, A4Q2 will fire and pull down the bus at A3Q11 base. The power relay will open, the operate lamp will extinguish and the current overload lamp will light. S1 must now be switched to standby and back to operate to reset A4Q2 and resume operation.

If a thermal overload occurs, A4Q3 will turn on and pull down the control bus. The power relay will open, the operate lamp will extinguish and the thermal overload lamp, DS3, will light. When the overheated condition subsides, the power supply will automatically resume operation.

If a VSWR overload occurs (in units incorporating this option), A4Q1 will fire and pull down the control bus. The power relay will open, the operate lamp will extinguish and the VSWR overload lamp, DS1, will light. S1 must now be switched from operate to standby and back to resume operation.

To summarize, the control circuit operates the power relay and provides the following indications as necessary:

A. Time Delay
B. Standby
C. Operate
D. Helix current overload
E. Thermal overload
F. VSWR overload (optional)

5.0 TROUBLESHOOTING GUIDE

NOTE - Do not attempt to repair the amplifier if it is within the warranty period. Return it to the factory for repair.

WARNING - Lethal voltages are present in this equipment when it is operating normally. When it is malfunctioning, high voltages may be present in unexpected locations. Use extreme caution when servicing this equipment.

5.1 AMPLIFIER MALFUNCTIONS

Malfunctions of the amplifier are manifested in several ways. Some of these are:

A. Improper RF output (or no RF output)
B. Repeated fault indications
C. No response to controls
D. Excessive input currents
E. Arcing sounds or burnt component odors

The first priority in locating a fault is isolating it to the traveling wave tube or power supply. A troubleshooting chart is provided as Table 1 to aid in this phase of the diagnosis. If the fault cannot be isolated to the TWT with the chart, the next step is to disconnect the TWT and follow the calibration procedure given for the power supply. If the power supply calibrates properly and there are no overt signs of power supply malfunction, the TWT may be assumed faulty and replacement is the only course of action.

5.2 POSSIBLE CAUSES OF FAULTS

If the fault is isolated to the encapsulated sections of the equipment during the tests described in this section, it should be returned to the factory for repair. Lethal voltages are generated in the potted section and no attempt should be made to repair the potted section is the field.

5.2.1 NO RF OUTPUT

A. Check that sufficient RF input power is applied in the correct frequency band.

B. Check that the operate lamp (blue) is lighted.

C. Check that correct line voltage is applied and that both circuit breakers are closed.

D. Check that the helix current meter indicates several milli-amperes of current.

E. Check all RF connections.

F. If all the above checks give good results, it is likely that the TWT is faulty. However, to be sure, the power supply should be connected to the dummy calibration load and checked per the calibration procedure.

G. Power supply faults that could result in no RF output are low supply voltages, overload, loss of heater voltage, and control circuit faults. All of these faults can be detected with the calibration procedure.

5.2.2 LOW RF OUTPUT

A. Check that sufficient RF drive power, in the proper frequency range is applied.

B. Check all RF connections and input/output VSWR ≤2.0:1.

C. Possible causes of low RF output are low gain TWT, low cathode emission in the TWT, low heater voltage, improper cathode voltage. The power supply should be checked per the calibration procedure. If it checks satisfactory on all outputs, the TWT is probably faulty.

5.2.3 POWER OUTPUT VARIES WITH LINE VOLTAGE

A. This is caused by loss of helix voltage regulation. The following components in the power supply could cause this condition:

1. A5CR14, CR13 not stable at 9.0V ±5%.
2. ±5% - Could be caused by A5R11 high resistance.
3. A5R12 open.
4. A5Q5 shorted or open.
5. A5Q7 shorted or open.
6. A5CR15 open.
7. A5R20 open.
8. A5Q6 shorted or open.
9. A3Q14 shorted or open.
10. A5R16 fouled contact or open.
11. A5R17 open.
12. A2R9 - R12 open (potted).
13. A3Q1 - Q8 open (one or two transistors).

5.2.4 HIGH RF NOISE

Terminate the input with 50 ohms. If the noise persists, there is a fault in the TWT, most likely it is oscillating. Incorrect voltages from the power supply could conceivably cause oscillation so the power supply should be checked per the calibration procedure before replacing the TWT.

5.2.5 4kHz MODULATION ON THE RF OUTPUT

A. This is caused by excessive ripple on the cathode to helix voltage. This can occur if the high voltage filter opens or the regulator has reduced high frequency gain.

B. Check A5C3 for an open condition.

C. Check A2R9 - R12 for open condition.

D. If a capacitance bridge is available, the cathode to ground capacitance can be checked. It should be 0.2µf ±10%.

5.2.6 HELIX OVERCURRENT OVERLOADS REPEATEDLY

A. This can be caused by arc paths in the TWT or high voltage section of the power supply or A4R17 may be set too low.

B. Disconnect the TWT and check for overloads. If the power supply does not overload at no load, either the TWT is arcing or A4R17 is adjusted too low. Connect a dummy load to the cathode output and set A4R17 for the maximum desired helix current. Reconnect the TWT. If the amplifier still overloads, check A4C7 for open condition.

5.2.7 REPEATED THERMAL OVERLOADS

A. This can be caused by insufficient cooling or a faulty thermal switch or A4Q3 shorted. If the TWT is hot and there is a thermal overload, check A4Q3 for a short and check the thermal switch for a short.

B. If the TWT is hot, check the airflow passage for a block. Check the TWT mounting for a good thermal contact to the heat sink. Check that the blower is operating.

5.2.8 EXCESSIVE INPUT CURRENT

A. This is almost certainly caused by a short in one of the input components or wiring. A circuit breaker should open.

B. Also, it could be caused by A3Q1 - Q8 shorted.

C. Make an ohmmeter check of the filament bus, the helix bus, and the two input transformers.

5.2.9 LOW FREQUENCY MODULATION OF THE RF OUTPUT

A. This is an indication of helix regulator oscillation.

B. Check A2R9 - R12 for open condition.

5.2.10 120Hz MODULATION ON THE RF OUTPUT

A. This indicates high ripple on cathode voltage output of the power supply.

B. Regulator, reference modulating or feedback shield broken.

C. Failure of A1L1 and A1C1 (as well as A1C2 for dual collector supplies) could cause this condition. They are not potted, so they can be checked with an impedance bridge.

WARNING - Be sure power is disconnected and A1C1 (and A1C2 where applicable) is discharged. Also check for discharged cathode supply.

6.0 POWER SUPPLY CALIBRATION

6.1 INTRODUCTION

Before reconnecting the TWT after repair or when replacing the TWT, a voltage calibration of the power supply is necessary to prevent possible damage to the TWT or the power supply.

6.2 TEST EQUIPMENT REQUIRED

DESCRIPTION	MANUFACTURER	MODEL NUMBER
VOM	TRIPLETT	630-NA
OSCILLOSCOPE	TEKTRONIX	545B
OSCILLOSCOPE PLUG-IN	TEKTRONIX	B OR H
RMS VOLTMETER	HEWLETT-PACKARD	3400A
LOAD FIXTURE	(SEE FIGURE 3)	
VSWR SIMULATOR (OPTIONAL)		
POWER SUPPLY 0 TO 5VDC		

CAUTION - At no time should a collector supply be operated without the proper load at its output. Operation of the unit with the collector supply unloaded may result in premature unit failure and void the warranty.

6.3 VOLTAGE ADJUSTMENT PROCEDURE

6.3.1 SET-UP

Replace the TWT with the load fixture, as shown in Figure 3. Select load appropriate to the TWT current demand. No taps on A1T1 (collector transformer) should be changed unless the frequency band is to be changed.

CAUTION - The filament voltage adjustment, R24, as described herein is factory set for a 2.4A filament. The adjustment should not need changing. If, however, the user feels a need to adjust the filament, use the utmost precaution.

WARNING - When the supply is in the operate mode, lethal voltages are present. When checking TWT element voltages, be sure the TWT amplifier is **OFF** during voltmeter connections.

6.3.2 FILAMENT VOLTAGE ADJUSTMENT

NOTE - This voltage should not need to be adjusted unless component changes have affected the values or a new TWT is being installed.

NOTE - To obtain an accurate filament voltage adjustment, the lead length of the filament load should be about equal to the normal lead length to the TWT and the measurement should be taken at this normal length.

CAUTION - Do not place the unit in the operate mode during this adjustment.

6.3.2.1 The filament voltage adjustment is R24 on the helix heater regulator board, part number 74D0045-1. See Figure 4 for the proper location of R24. Rotating R24 clockwise decreases the filament voltage.

6.3.2.2 Place the RMS voltmeter from filament to cathode.

6.3.2.3 Place the amplifier in standby and measure the filament voltage, comparing it to specific TWT voltage requirements.

6.3.2.4 Turn off the amplifier and disconnect the voltmeter.

6.3.3 COLLECTOR/CATHODE TO HELIX VOLTAGE RANGE SELECTION

NOTE - This procedure should be followed if the TWT type is changed (E.G. different frequency band.)

6.3.3.1 The collector and cathode to helix voltage range is selected by using the appropriate combination of taps on the collector transformer. The taps are marked 1 through 17 and are easily accessible from the top of the unit. Table 2 shows a match of collector voltage and current and an appropriate cathode to helix voltage range for use with a selection of traveling wave tubes from L to KU band, 100 and 200 watts.

Wires to taps 1,7 and 13 always remain fixed. The two orange wires, always together, can vary between taps 2 through 6. The one red wire can vary between taps 8 through 12. The four brown wires, always together, can vary between taps 14 through 17. The orange and red wires select the appropriate windings and phasing of the transformer primary. The brown wires select the appropriate low voltage secondary output tap.

6.3.4 COLLECTOR VOLTAGE CHECK

6.3.4.1 Place the high voltage DC voltmeter positive lead to the collector and the negative lead to the cathode.

WARNING - The meter negative will be floating at the high negative cathode potential.

CAUTION - Be sure the collector load resistor size is calculated to accommodate the correct current desired.

6.3.4.2 Apply 115 or 230VAC to the unit and place in the operate mode. Allow the three minute time delay to elapse.

6.3.4.3 Measure the collector voltage.

6.3.4.4 Turn off the amplifier and disconnect the voltmeter.

6.3.4.5 Repeat for collector 2, if applicable.

6.3.5 CATHODE TO HELIX VOLTAGE ADJUSTMENT

6.3.5.1 The cathode to helix voltage has two adjustments, coarse, R16, and fine, R26, on the helix/heater regulator board, Part Number 74D0045-1. See Figure 4 for the location of R16 and R26. Rotating R16 and R26 clockwise increases the cathode to helix voltage.

6.3.5.2 Place the high voltage DC voltmeter negative lead to cathode and positive lead to helix ground.

CAUTION - Do not adjust the cathode to helix voltage without monitoring it.

6.3.5.2 Apply 115 or 230VAC to the unit and place the unit in the operate mode. Allow the three minute time delay to elapse.

6.3.5.4 Adjust the coarse adjustment, R16, to obtain the approximate voltage desired, within ±100VDC. Then adjust the fine adjustment, R26, to the correct voltage desired. The fine adjustment becomes more useful at higher cathode to helix voltages.

6.3.5.5 Turn off the amplifier and disconnect the voltmeter.

6.3.6 HELIX CURRENT OVERLOAD ADJUSTMENT

6.3.6.1 The helix current overload adjustment is R17 on the control board, Part Number 74D0114-1. See Figure 4 for the proper location of R17. Rotating R17 clockwise increases the helix current trip point.

6.3.6.2 Calculate and set up the appropriate cathode to helix load to obtain the desire current for overload.

6.3.6.3 Adjust R17 fully counterclockwise.

6.3.6.4 Apply 115 or 230VAC input and place the unit in the operate mode. Allow the three minute time delay to elapse.

6.3.6.5 Adjust R17 clockwise until the unit overloads.

6.3.6.6 Turn off the amplifier and remove the excessive helix load.

6.3.7 VSWR OVERLOAD ADJUST (OPTIONAL)

6.3.7.1 An additional power supply, 0 to 5VDC, must be used for this adjustment. The VSWR overload adjust is R1 on the control board, part number 74D0114-1. See Figure 4 for proper location of R1.

6.3.7.2 The VSWR input is Pin 21 and Pin 22 (for ground) of the J1 remote control connector.

6.3.7.2 Adjust R1 fully counterclockwise.

6.3.7.4 Apply 115 or 230VAC input and place the unit in the operate mode. Allow the three minute time delay to elapse.

6.3.7.5 Apply the desired VSWR trip voltage positive to J1 Pin 21 and negative to Pin 22.

6.3.7.6 Adjust R1 clockwise until the unit overloads.

6.3.7.7 Turn off the amplifier and remove the VSWR simulator power supply.

6.3.7.8 All adjustments are complete. Remove the load fixture and replace the traveling wave tube. Turn to Section 7.0 to perform an RF operational check.

7.0 RF RESPONSE CHECK

7.1 INTRODUCTION

After the power supply calibration, an RF response check will determine if the amplifier meets RF specifications.

7.2 TEST EQUIPMENT REQUIRED

Description	Manufacturer	Model No.
RF Sweep Generator*	Alfred	650
Oscillator Plug-In	Alfred	
(For L Band)		651K
(For S Band)		652K
(For C Band)		653K
(For X Band)		655K
(For Ku Band)		657K
RF Power Meter (2)	Hewlett-Packard	413C
Directional Coupler (-23db) (Quantity 3)		
PAD (20db)		
RF Load (500 Watts)		
RF Load (20 Watts)		

* Any RF signal generator may be used that is capable of delivering a 20dbm RF signal across the band width desired.

WARNING - RF input signals greater than 500mW will damage the TWT and void the unit warranty.

7.3 RF CHECK

7.3.1 Connect the RF test connections as shown in Figure 5.

7.3.2 Place the amplifier in operate and allow the time delay to elapse.

7.3.3 Using the data sheet in Appendix A, list under frequency from 8 to 10 increments of the amplifier band width.

7.3.4 Small signal gain or gain at rated power.

7.3.4.1 Apply a 0dbm RF input to the amplifier at the band low frequency.

7.3.4.2 Measure and record the amplifier RF output in dbm.

7.3.4.3 Increase the RF input frequency to each succeeding increment, while holding a 0dbm level, and measure and record the respective power output readings.

7.3.4.4 Subtract the RF input from the RF output and record the gain at each increment.

7.3.5 SATURATED POWER OUTPUT

7.3.5.1 Return the input to the band low frequency and increase the RF input until the TWT amplifier RF power output is saturated.

7.3.5.2 Measure and record the RF input and saturated RF output.

7.3.5.3 Repeat the previous two steps for each increment of the amplifier band width.

7.3.6 Turn off the amplifier and remove the test equipment.

THE TEST IS COMPLETE.

8.0 IEEE CONTROLLER

8.1 GENERAL

HARDWARE REQUIREMENTS:

To operate the TWTA from a GPIB controller, you must have:

A. An IEEE controller (such as the HP 85, the National Instruments GPIB card and a PC, etc.).

B. An IEEE cable to interconnect the controller to the TWTA.

ABOUT THE IEEE:

The IEEE bus allows communication between several different devices and a controller. The job of the controller is to initialize and monitor communication between these devices. In the case of a TWTA amplifier, the controller acts as the interface between the operator and the amplifier. The controller sends commands to and requests data from the amplifier. The form of this communication is a standard set by the IEEE.

The controlling computer will convert the operator's commands to a data string that the TWTA IEEE device will recognize. The controlling computer often has its own specific language which initializes either a write or a read command. **You must be familiar with your controller's command language as Keltec cannot support your controller's software.** Examples of some controller specific commands are: the HP85 **OUTPUT 708:** command or the National Instruments **IBWRT** command. Any questions regarding your controller's command language should be referred to your controller's manufacturer or the literature which accompanied your controller. These controller specific commands are then usually followed by the TWTA command mnemonic. I.E. **IBWRT "TLK MON"**. The TWTA command mnemonic should be contained within quotation marks " ". When requesting data from one of the telemetry screens, the desired piece of information should be preceded by TLK. an example is : "TLK HXI" which would request data about the helix current. When sending a command, TLK is not necessary, i.e. "PWRON" will turn AC power on.

None of the factory set limits or configurations can be modified by the customer. If these values should change for any reason, contact the factory for instructions to correct them.

Since the IEEE controller can be connected to several devices at the same time, each device is given a listen address so that the controller knows which device to communicate with and which device is requesting service.

8.2 STATUS AND TELEMETRY COMMANDS

The controller will display all of the status and telemetry signals in either a screen format or as discrete signals. To display the data in a screen format, send one of the following mnemonics to the controller. If the mnemonic is preceded by TLK, the message will be generated and transmitted over the GPIB bus.

MON - Monitor screen. This will display all of the telemetry voltages of the power supply plus any RF telemetries available from the amplifier.

ELT - Elapsed time screen. This displays the elapsed time of the IEEE controller.

FLMT - This displays the factory set limits. These values are set at the time of final testing and cannot be changed by the customer.

CFG - This displays the configuration screen. The configuration screen displays the listen address of the amplifier and the configuration byte of the controller. The configuration byte is set at the time of final test and is used to change the displays and commands for different option configurations. This cannot be changed by the customer.

R630/R730:

The telemetries available are:

HXI - The helix current in mA.

HXV - The helix voltage in kV.

RF REF - RF reflected power in W.

CV - Collector voltage in kV.

If there is a mnemonic common to both a measurement and a limit such as HXI, then HXI will specify the measured value in the MON screen and FLMT HXI will specify the factory limit for HXI.

If any of the above mnemonics is preceded by TLK, the controller will generate a message containing the value of that mnemonic. For example:

```
Command     TLK RF OUT
Response    RF OUT 250  [where the current RF output is 250W]

Command     TLK FLMT HXI
Response    HXI 100.0   [where the factory set Helix I limit is
                         100.0 A]
```

8.3 COMMANDS

PWRON - Applies prime power to the TWTA.

PWROFF - Removes prime power from the TWTA.

OPER - Turns the high voltage ON, placing the TWTA in OPERATE.

SBY - Puts the unit in STANDBY.

RESET - Resets the TWTA from a fault condition.

POWER SEQUENCE

When an operate command is executed, the CPU will check the status of the PWR ON. If the PWR ON is true, the OPER level will be set true. The CPU will wait about 2 seconds before it verifies the status of the READY input. If the READY signal is not true, the CPU will go to STANDBY. This means that the OPER command will have to be re-entered after the time delay has elapsed.

The CPU will wait 500mS and then verify that the high voltage is on. If the HV is on, then an error checking will be enabled.

8.4 OPERATING INSTRUCTIONS

FRONT PANEL CONTROLS

When the front panel rotary switch is in either the off, standby, or operate position, no power is supplied to the IEEE circuits which disables the IEEE interface. When the rotary switch is placed in the remote position, the IEEE circuits are enabled. The IEEE "switches" are connected to the different sections of the rotary switch, S1.

The prime power is controlled through a 3PDT relay. All of the contacts of the relay are connected in series with the prime power circuit breaker. This provides protection of the amplifier. The prime power to the IEEE circuits are connected at the circuit breaker so that the IEEE controller will have power when the amplifier is in the PWR OFF mode.

Connect the interconnect cable to the back panel remote connector.

Set the address of the TWTA.

The address select switch is an eight position DIP switch located on the rear panel of the unit. The address is in binary and is factory preset as 8. See Figure 6.

Turn the controller on.

Place the front panel rotary switch in the REMOTE position.
The amplifier will now recognize commands from the controller.

NOTE - Different IEEE488 controllers have different instructions for opening devices, sending data, etc. Because there are so many different controllers, this manual will cover only the commands and mnemonics recognized by the TWTA.

Put the front panel circuit breakers in the on position.

Apply prime power:
Command "PWR ON"
Response [time delay indicator should light and fan should be running]

Wait 3 minutes for the TWT warm-up period.
The Standby indicator will light after the time delay has elapsed.

Place the TWTA in the OPERATE mode:
Command "OPER"
Response [operate indicator should light and the high voltage should come on]

To reset the unit from a fault condition-
command "SBY"
response [Operate and fault indicators will go out]
command "OPER"
response [Operate indicator should light and the high voltage should come on]

To turn amplifier off-
command "SBY"
response [Operate indicator will go out]

Wait 1 - 2 minutes for the TWT to cool down before removing prime power.
Command "PWR OFF"
Response [All indicators should go out and the fan will stop]

8.5 READING DATA

R630/R730:

Data can be read by calling each telemetry separately or by calling up one of the screens available.

To call up the monitor screen-
command "TLK MON"
Response [The screen will display the following telemetries]
HXI (helix current) 0 - 50 mA
HXV (helix voltage) 0 - 14kV
CV (Collector-to-cathode voltage) 0 - 10kV
RF REF (RF reflected power) 0 - 500W (Optional)

To call up helix current-
command "TLK HXI"
Response HXI (current value)

To call up helix voltage-
Command "TLK HXV"
Response HXV (current value)

To call up collector voltage-
Command "TLK CV"
Response CV (current value)

To call up RF reflected power (Optional)-
Command "TLK RF REF"
Response RF REF (current value)

To call up the ELT screen-
Command "TLK ELT"
Response ELT (current elapsed time)

To view the factory limits-
Command "TLK FLMT"
Response [Telemetries and limits]

To call up helix current factory limit-
Command "TLK FLMT HXI"
Response HXI (current value)

To call up the configuration screen-
Command "TLK CFG"
Response [the configuration byte and listen address will be displayed]

To view the configuration byte-
Command "TLK CFB"
Response CFB (current value)

8.5 READING DATA

R630/R730:

Data can be read by calling each telemetry separately or by calling up one of the screens available.

To call up the monitor screen-
command "TLK MON"
Response [The screen will display the following telemetries]
HXI (helix current) 0 - 50 mA
HXV (helix voltage) 0 - 14kV
CV (Collector-to-cathode voltage) 0 - 10kV
RF REF (RF reflected power) 0 - 500W (Optional)

To call up helix current-
command "TLK HXI"
Response HXI (current value)

To call up helix voltage-
Command "TLK HXV"
Response HXV (current value)

To call up collector voltage-
Command "TLK CV"
Response CV (current value)

To call up RF reflected power (Optional)-
Command "TLK RF REF"
Response RF REF (current value)

To call up the ELT screen-
Command "TLK ELT"
Response ELT (current elapsed time)

To view the factory limits-
Command "TLK FLMT"
Response [Telemetries and limits]

To call up helix current factory limit-
Command "TLK FLMT HXI"
Response HXI (current value)

To call up the configuration screen-
Command "TLK CFG"
Response [the configuration byte and listen address will be displayed]

To view the configuration byte-
Command "TLK CFB"
Response CFB (current value)

To view the listen address-
Command "TLK LSN"
Response LSN (current value)

8.6 STATUS BYTE

A status message could be obtained by requesting the unit to talk on the GPIB bus. A status byte can be obtained by serial polling the unit. The method of polling the TWTA is controller dependent. Consult your controller documentation.

HARDWARE FAULTS
R630/R730:

Status Byte	Priority	Corresponding Fault
97	3	TEMP FAULT
98	2	RF REF PWR FAULT
99	1	HXI FAULT
100	4	TWT TEMP FAULT
105	6	HXV FAULT

LIMITS

Status Byte	Priority	Corresponding Fault
82		RF REF LIMIT
93		HXI LIMIT

SOFTWARE STATUS

Status Byte	Priority	Corresponding Fault
65	1	ROM ERROR
66	2	RAM ERROR
67	3	DMA OVERFLOW
68	4	BUS LOCAL
69	5	SYNTAX ERROR
70	6	RANGE ERROR
71	7	LOCAL CONTROL
72	8	POWER FAULT

TABLE 1
TROUBLESHOOTING CHART

PARA	AMPLIFIER FAULT SYMPTOM	FAULTY UNIT		
		TWT	P.S.	EITHER TWT, P.S. OR BOTH
5.2.1	NO RF OUTPUT			X
5.2.2	LOW RF OUTPUT			X
5.2.3	POWER OUTPUT VARIES WITH LINE VOLTAGE		X	
5.2.4	HIGH RF NOISE	X		
5.2.5	4kHz MODULATION ON RF OUTPUT		X	
5.2.6	HELIX OVERCURRENT OVERLOADS REPEATEDLY			X
5.2.7	REPEATED THERMAL OVERLOADS			X
5.2.8	EXCESSIVE INPUT CURRENT		X	
5.2.9	LOW FREQUENCY MODULATION OF THE RF OUTPUT		X	
5.2.10	120Hz MODULATION ON THE RF OUTPUT		X	

TABLE 2
COLLECTOR VOLTAGE AND CATHODE TO HELIX VOLTAGE RANGE SELECTION GUIDE

	TWT BAND AND WATTAGE	COLLECTOR VOLTAGE AND CURRENT	CATHODE TO HELIX VOLTAGE RANGE AND MAXIMUM CURRENT	TAP SELECTION		
				ORANGE WIRES	RED WIRES	BROWN WIRES
1	L BAND 100 WATT	2750 TO 3400VDC 330mA	-2750 TO -3400VDC 50mA	5	11	14
2	L BAND 200 WATT	3100 TO 3900VDC 450mA	-3100 TO -3900VDC 65mA	4	10	14
3	S BAND 100 WATT	2000 TO 2700VDC 350mA	-2600 TO -3400VDC 40mA	6	12	16
4	S BAND 200 WATT	2600 TO 3200VDC 420mA	-3200 TO -4200VDC 70mA	5	11	15
5	G BAND (2.6-5.2) 200 WATT	2700 TO 3300VDC 430mA	-4100 TO -4700VDC 40mA	5	11	16
6	C BAND 100 WATT	2700 TO 3600VDC 260mA	-4200 TO -4800VDC 15mA	5	11	16
7	C BAND 200 WATT	4000 TO 5000VDC 300 mA	-8000 TO -9000VDC 25mA	2	8	17
8	CX BAND (7-11) 100 WATT	2800 TO 4000VDC 240mA	-4900 TO -5600VDC 20mA	4	10	16
9	X BAND 100 WATT	2800 TO 4000VDC 240mA	-4900 TO -5600VDC 20mA	4	10	16
10	X BAND 200 WATT	4000 TO 5000VDC 350mA	-8300 TO -9500VDC 25mA	3	9	17
11	KU BAND 100 WATT	3800 TO 5000VDC 230mA	-8400 TO -9100VDC 20mA	3	9	17
12	IJ BAND 200 WATT	COLLECTOR 1: 57% @ 150mA COLLECTOR 2: 34% @ 330mA	-10200 TO -10600VDC	2	6	15

NOTE - TAPS 1, 7 AND 13 ALWAYS REMAIN FIXED.

8-18GHz TWT HEATER CURRENT AFTER A COUPLE OF MINUTES WAS 1.38A @ 6.3V D.C. USING EXT PSU.

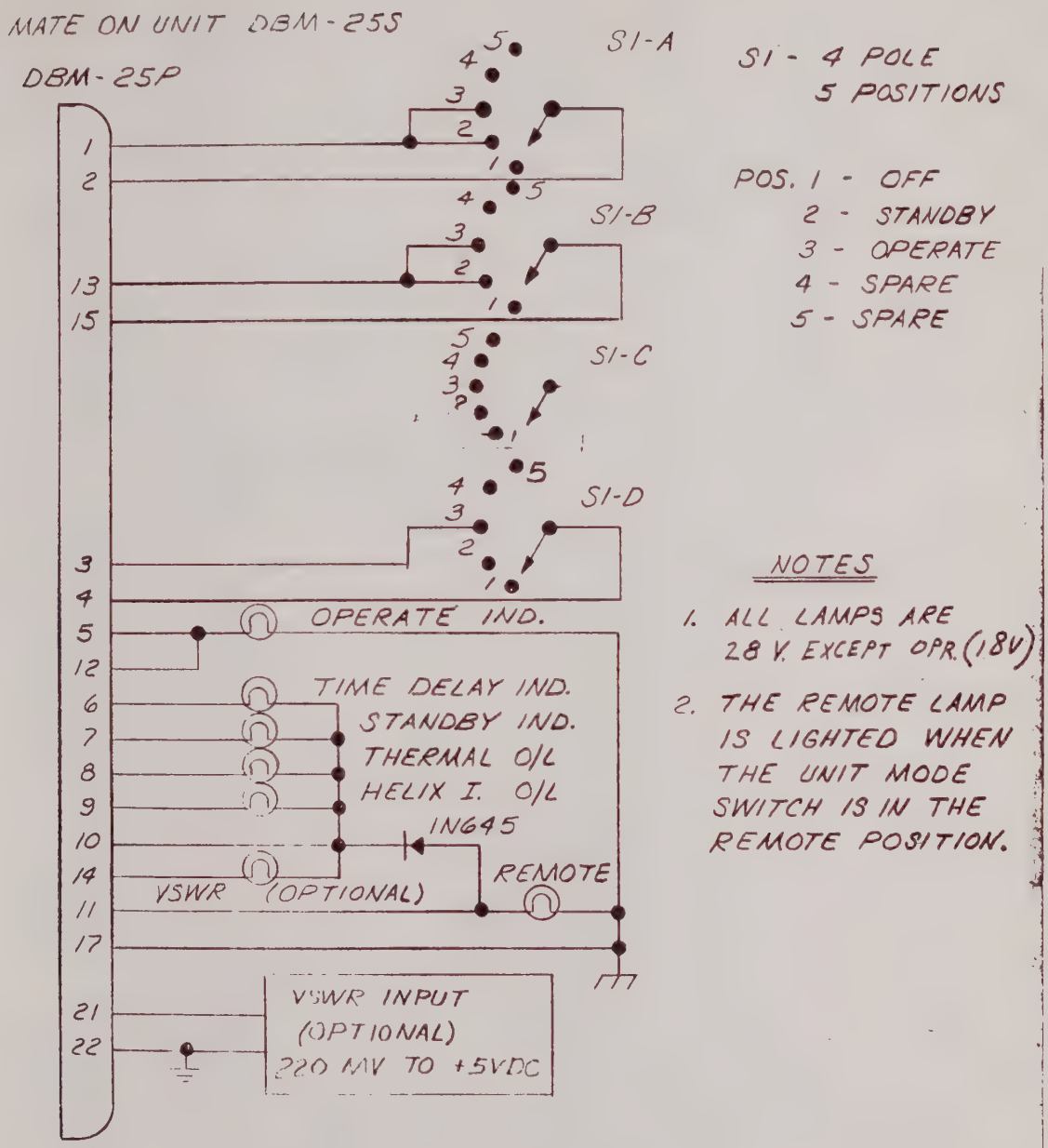


FIG. 1 - REMOTE CONTROL MODULE FOR R630-100/200 AMPLIFIERS

KELTEC FLORIDA FORT WALTON BEACH, FLORIDA	SIZE A	CODE IDENT NO 09062	74A0213
	SCALE	SHEET 41	REV

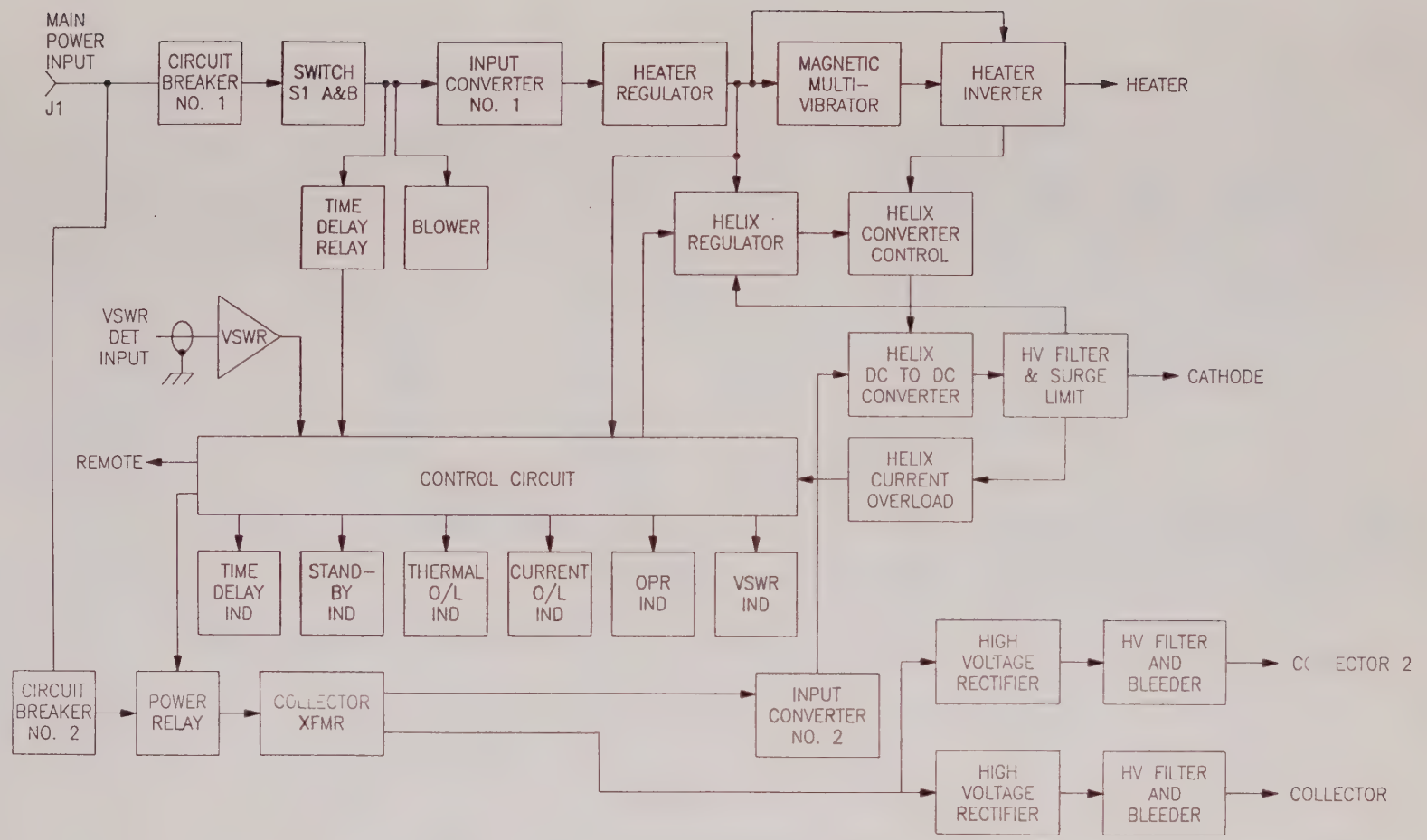
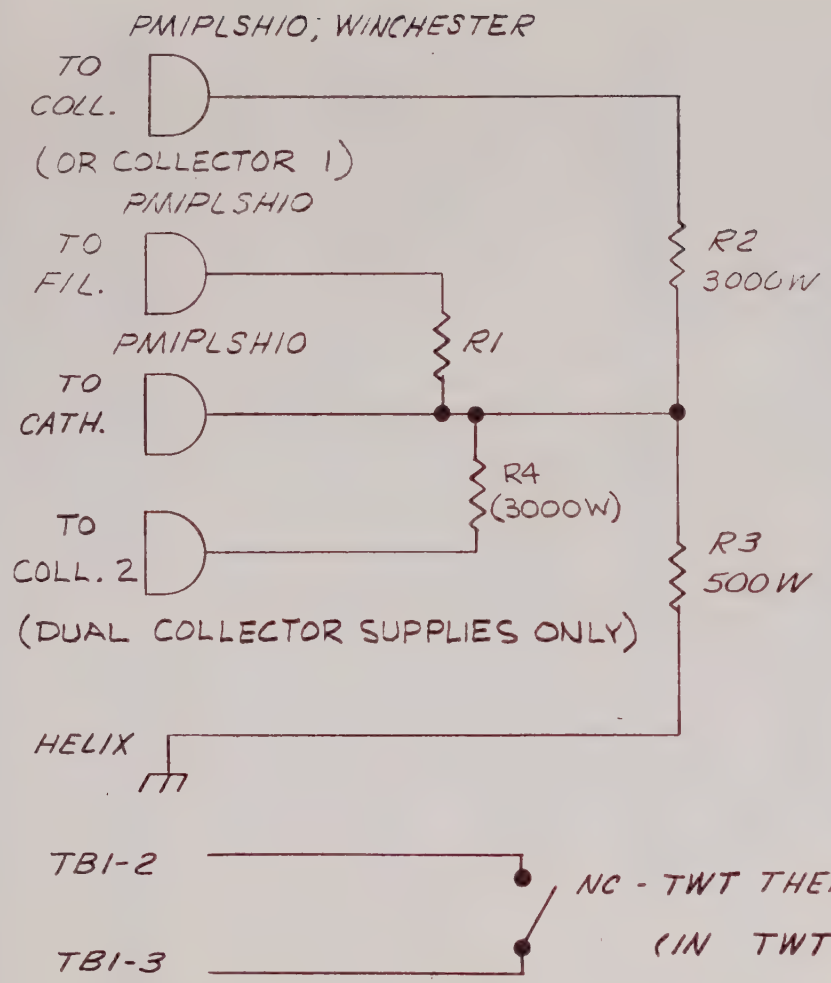


FIG. 2 POWER SUPPLY BLOCK DIAGRAM

KELTEC FLORIDA
FORT WALTON BEACH, FLORIDA

SIZE A | CODE IDENT NO 09062 | SCALE | SHEET 43 | REV

74A0213



NOTES

1. R2 & 3,4 MUST BE CAPABLE OF WITHSTANDING HIGH VOLTAGE.
2. THE VALUE AND WATTAGE OF EACH RESISTOR MUST BE DETERMINED FROM SPECIFIC TWT VOLTAGE REQUIREMENTS.

FIG. 3 - LOAD FIXTURE FOR R630-100/200 AMPLIFIERS

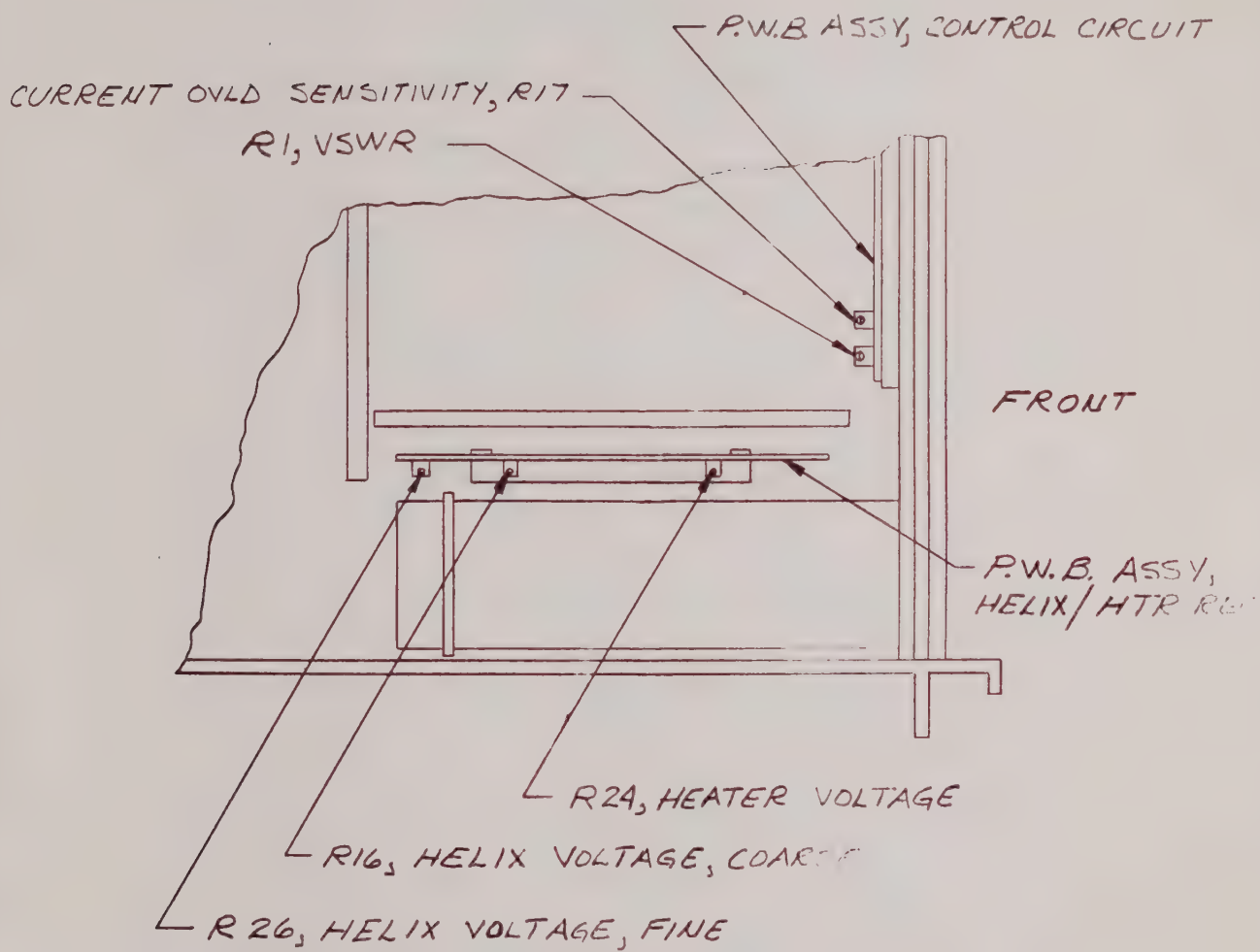


FIG 4 – LOCATION OF ADJUSTMENTS

ON -2 UNITS

KELTEC FLORIDA FORT WALTON BEACH, FLORIDA	SIZE A	CODE IDENT NO 09062	74A0213
	SCALE	SHEET 44	REV

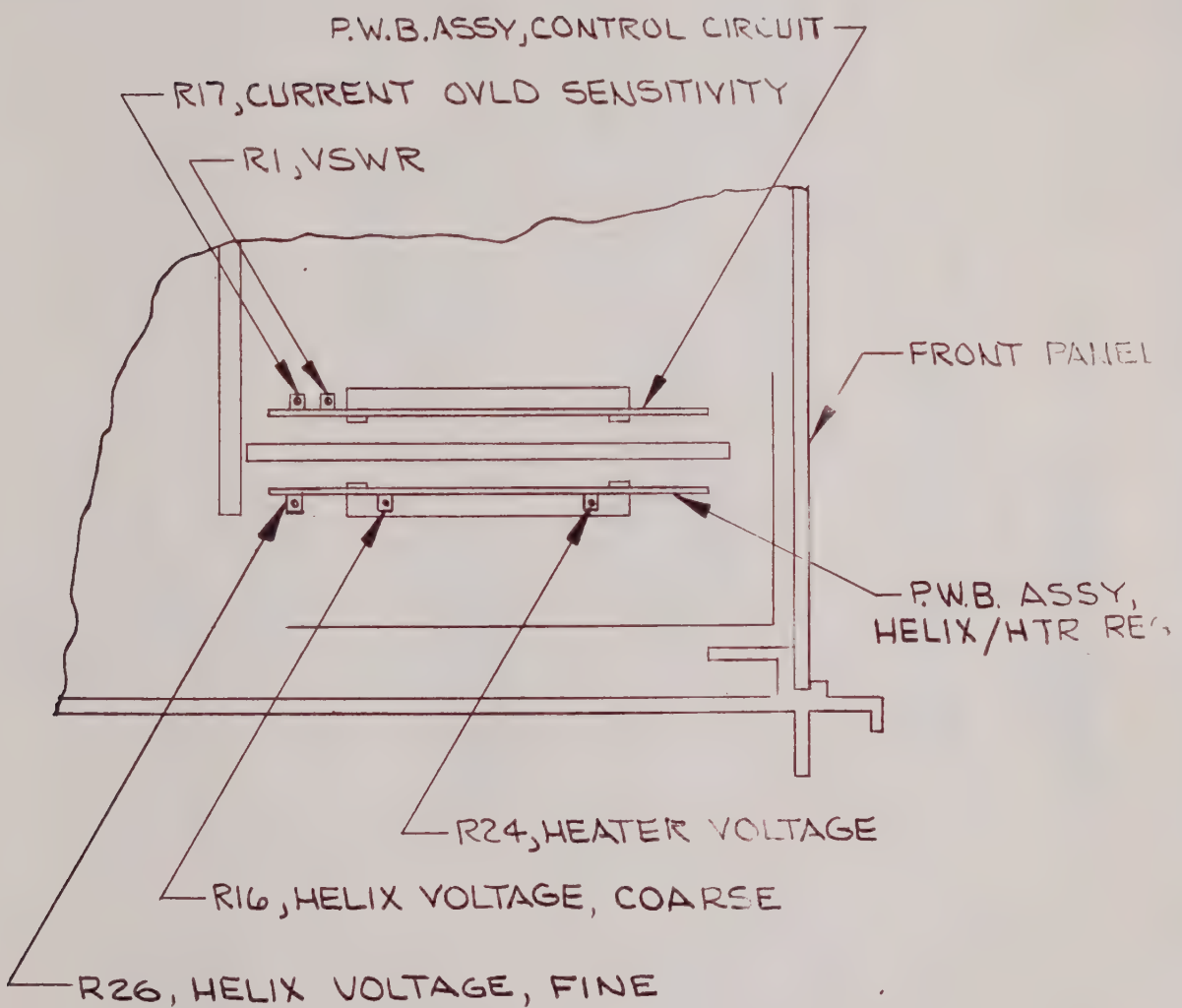


FIG.4-LOCATION OF ADJUSTMENTS

on -1 units

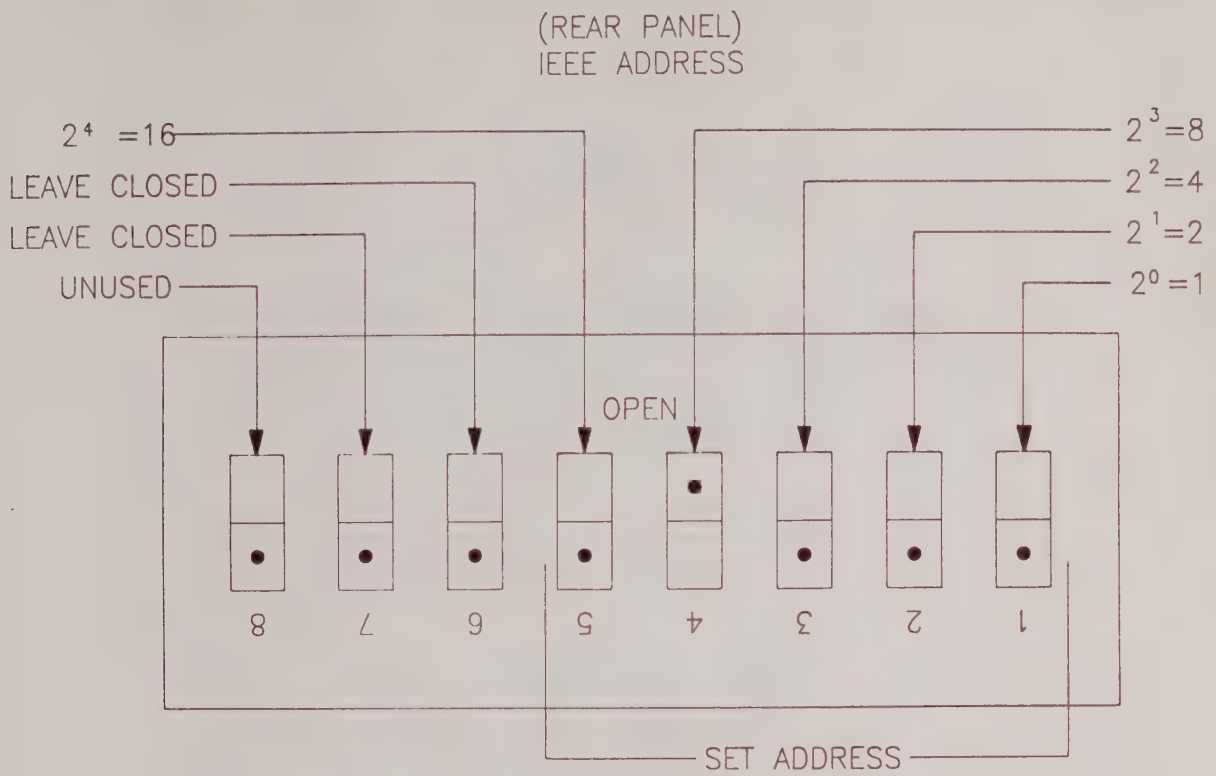
KELTEC FLORIDA FORT WALTON BEACH, FLORIDA	SIZE A	CODE IDENT NO 09062	74A0213	
	SCALE	SHEET	45	REV

RF TEST CONNECTIONS
FOR 200 WATT AMPLIFIERS

FIG. 5

KELTEC FLORIDA FORT WALTON BEACH, FLORIDA	SIZE A	CODE IDENT NO 09062	
	SCALE	SHEET	REV

74A0213



THE VALUE IS SELECTED WHEN THE SWITCH IS OPENED.

EXAMPLE 1 – (FACTORY SET ADDRESS = 8)

C C C C 0 C C C
8 7 6 5 4 3 2 1 = $2^3+0=8$

EXAMPLE 2 – (ADDRESS = 11)

C C C C 0 C 0 0
8 7 6 5 4 3 2 1 = $2^3+2^1+2^0$
$=8+2+1$
$=11$

FIG. 6 SETTING THE LISTEN ADDRESS

KELTEC FLORIDA FORT WALTON BEACH, FLORIDA	SIZE A	CODE IDENT NO 09062	74A0213
	SCALE	SHEET 47	REV

APPENDIX A

POWER SUPPLY ACCEPTANCE TEST DATA SHEET
FOR KELTEC STANDARD FULL RACK AMPLIFIERS
MODELS R630-100/200 AND R730-100/200

RF RESPONSE DATA SHEET
TRAVELING WAVE TUBE AMPLIFIER

KELTEC FLORIDA
FORT WALTON BEACH, FLORIDA

SIZE A | CODE IDENT NO 09062

SCALE | SHEET A2 49

74A0213

REV

POWER SUPPLY ACCEPTANCE TEST DATA SHEET FOR KELTEC STANDARD FULL RACK AMPLIFIERS
MODELS R630-100/200 AND R730-100/200

MODEL NO. _____ PART NO. _____ SERIAL NO. _____

FUNCTION	REQUIREMENT	DATA	REMARKS
FILAMENT VOLTAGE	6.3 ±0.13VRMS	_____VRMS	_____ AMP FIL LOAD
COLLECTOR VOLTAGE (WITH RESPECT TO CATHODE)	_____ TO _____KV AT _____mA LOAD	SET TO _____VDC AT _____mA LOAD	115 OR 230VAC INPUT
COLLECTOR RIPPLE	_____Vpp MAX	_____Vpp	115 OR 230VAC INPUT
CATHODE VOLTAGE ADJUST	_____ TO _____KV	_____V_{MAX} _____V_{MIN}	115 OR 230VAC INPUT
CATHODE REGULATION	SET TO _____KV	_____VDC	103.5 OR 207VAC, _____mA LOAD(HIGH)
(LINE AND LOAD)	Δ _____VDC MAX	_____VDC	126.5 OR 253VAC, _____mA LOAD (LOW)
CATHODE RIPPLE	_____Vpp MAX	_____Vpp	115 OR 230VAC, _____mA LOAD(HIGH)
CATHODE RISE TIME PLUS DELAY	500MS MAX	_____MS	TIMED FROM OPERATE WITH _____mA HELIX LOAD _____mA COLL. LOAD
CATHODE RISE TIME	50MS MAX	_____MS	
CATHODE TIME ON BEFORE OVERLOAD	50 TO 75MS	_____MS	
COLLECTOR RISE TIME	50MS MAX	_____MS	

CURRENT OVERLOAD AND CONTROL AND INDICATOR CHECK			
HELIX CURR OVERLOAD SET AT	_____(✓)	OPERATE IND.	_____(✓)
CURRENT OVERLOAD IND.	_____(✓)	VSWR IND.(AND J1 PIN 14) (OPTIONAL)	_____(✓)
THERMAL OVERLOAD IND.	_____(✓)	INTERLOCK OVERLOAD	_____(✓)
TIME DELAY IND.	_____(✓)	J2 REMOTE FUNCTION	_____(✓)
STANDBY IND.	_____(✓)	OTHER	_____(✓)

COLL XFMR TAP USED _____ RUN TIME _____

_____

Q.A. SIGN _____

TESTED BY _____

DATE _____

DRAWING LIST

MODEL NUMBER: IJR630-200, TWT MTI5015
OPTIONS: V2, E
UNIT ASSEMBLY: 87D0681-9

JOB NUMBER: 92951
INITIAL RELEASE:
ISSUE NO./DATE: 1, NOVEMBER 6, 1997

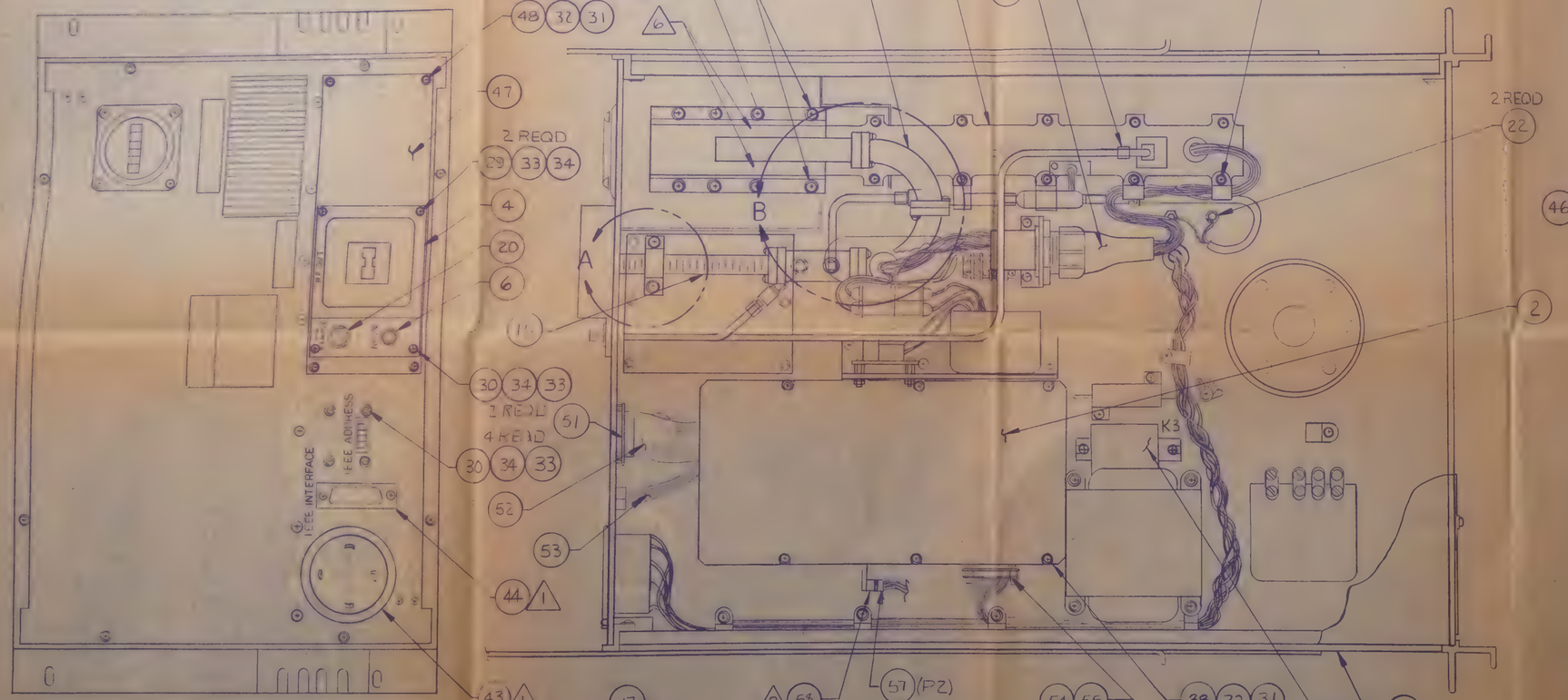
DWG SIZE	DRAWING NUMBER	DESCRIPTION	PRODUCT ASSY	PRODUCT TEST	QA
D	87D0681-9	UNIT ASSEMBLY			
D	...870169-9	BASIC POWER SUPPLY			
D	...87D1067	SCHEMATIC			
D	...87D1043	OUTLINE DRAWING			
D	...87D1069	WIRING DIAGRAM, CHASSIS			
A	...74A0213	OPERATING AND MAINTENANCE MNBK			
C	...87C1036-1	WAVEGUIDE SHROUD			
C	...869862-1	CONNECTOR PLATE			
B	...74B1074-1	PLATE I.D. (VSWR MT.)			
C	...857241-1	CLAMP TOP			
C	...857242-1	CLAMP PLATE			
D	...87D0990-9	ASSY, IEEE MODULE			
D	.....87D0879	WIRING DIAGRAM			
D	.....87D0877-1	BASE PLATE			
C	870226-19	CABLE ASSY			
C	.....87D0913-1	CONNECTOR PLATE			
D	870223-9	CCA, IO A2			
D	870222-1	PWB, I/O			
C	...870368-9	CCA, GPIB ADDRESS			
C	870367-1	PWB, GPIB ADDRESS			
C	...870377-9	CABLE ASSEMBLY			
C	...870225-9	CABLE ASSEMBLY			

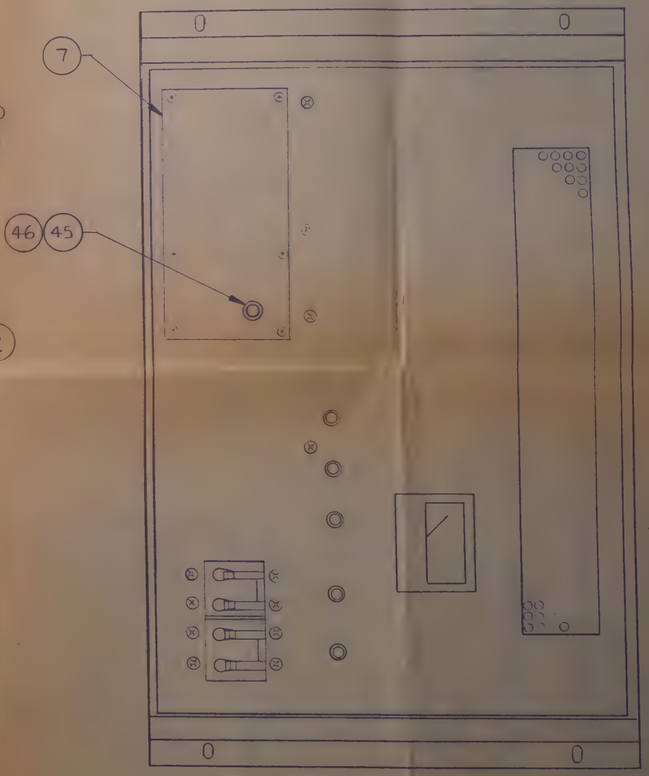
NOTES

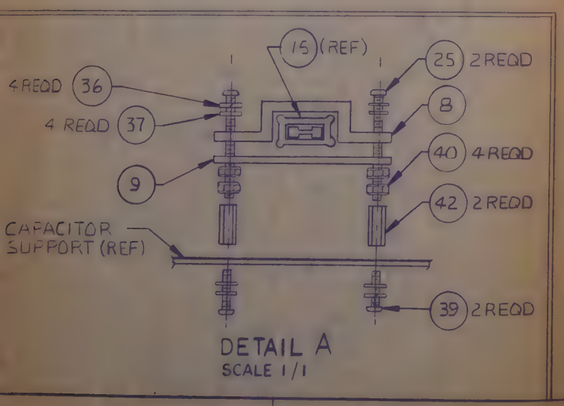
1. MATING CONNECTORS FOR J1 & J2 SHIPPED WITH UNIT.
2. FOR SCHEMATIC SEE DWG 87D1067.
3. FOR WIRING DIAGRAM SEE DWG 87C1065.
4. FOR OPERATING & MAINTENANCE INSTRUCTIONS SEE HANDBOOK 74A0213.
5. TORQUE CONNECTIONS 7-10 IN LBS.
6. USE 3M BRAND 1245 COPPER TAPE AROUND WAVE GUIDE OUTPUT IF NECESSARY.
7. APPLY AN EVEN COATING OF ITEM 49 TO MATING SURFACE OF ITEM 12. TIGHTEN SCREWS EVENLY AND WIPE OFF EXCESS.
8. RELOCATE J2 CONNECTOR FROM REAR PANEL ASSY TO THIS LOCATION, INSTALL USING HARDWARE SHOWN.

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD
–		ENGRG RELEASE	11/1/12	CLB
A		REV PER DCN N° 1739 ML LEMIX	12/1/21	CLB
B		PER DCN 1883 LEMIX RWG	12/7/18	RWB







DETAIL A
SCALE 1/1

DETAIL B

FOR SEPARATE PARTS LIST SEE PL 87D0681-9

-3 QTY REQD	-2 QTY REQD	-1 QTY REQD	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL	REF DESIG

LIST OF MATERIALS

QTY	USED ON	NEXT ASSY
1	IJR630200	FINAL

APPLICATION

MATERIAL

FINISH

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INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-D-1000

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES

TOLERANCES

BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
UNDER 6	± .01	± .005	± 1/64
6 TO 24 INCL	± .02	± .010	± 1/32
OVER 24	±	± .015	± 1/16
ANGLES ± 1/2°			

APPROVALS, SIGNATURE & DATE	
DRAWN	
CHECKED	
DWG SUP	Cawley 11/11/12
MECH.	
ELECT	J. Rimpurwala 11-11-87
MFG	
Q A	
PROJ APPD	

KELTEC FLORIDA — A DIVISION OF AMSTAR TECHNICAL PRODUCTS COMPANY, INC.

UNIT ASSEMBLY, IJR630-200 OPTIONS E, V2

SIZE	CODE IDENT	
D	09062	87D0681

SCALE 1/2 — SHEET 1 OF 1

K E L T E C F L O R I D A

Code Indent. 07062

TITLE: UNIT ASSEMBLY PL887D3681-9 REV: B

IJR630-200

ITEM NO	REFERENCE DESIGNATOR	DESCRIPTION	PART OR IDENTIFYING NUMBER	SPECIFICATION OR MANUFACTURER	QTY REQD
1		BASIC P.S. ASSEMBLY	870169-9	KELTEC	1
2		ASSY, IEEE MODULE	8700890-9	KELTEC	1
3		ATTENUATOR	102-15	MIDWEST MICROWAVE	1
4		WAVE GUIDE SHROUD	87C1036-1	KELTEC	1
5		ATTENUATOR	2082-6148-20	OMNI-SPECTRA	1
6		CONNECTOR	228639-1	AMP	1
7		PLATE I.D. (VSWR MT.)	7481074-1		1
8		CLAMP TOP	857241-1	KELTEC	1
9		CLAMP PLATE	857242-1	KELTEC	1
10		SCREW SPACER, TNT	641005-1	KELTEC	2
11		SMA CRIMP PLUG	228635-1	AMP	2
12		TNT	MTI50150	TELEDYNE	1
13		DETECTOR	4503 OPT 3	NARDA	1
14		RADIUS BEND	R130-C1-C3	MRC	2
15		FLEX. WAVE GUIDE	R170S-5-C2-C3	MRC	1
16		BNC, CABLE CONN.	31-002	AMPHENOL	1
17		COAX, RIGID	UT141ASP		AR
18		CONNECTOR, RIGHT ANGLE	228626-1	AMP	1
19		CABLE, RF	RG142	TIME COMM, INC.	AR
20		TNC FEMALE, BULKHEAD	3704-7841-02	OMNI-SPECTRA	1
21		DUAL DIRECTIONAL, COUPLER	R620-3-3-F	MRC	1
22		STAND OFF	572-4823-01-0516	CAMBION	2
25		SCREW, PH 8-32 x 1 1/4	MS51957-50		2
26		SCREW, PH 6-32 x 7/8	MS51957-33		2

KELTEC FLORIDA
Code Indent. 09062
TITLE: UNIT ASSEMBLY PL887D0681-9 REV: B
IJR630-200

ITEM NO	REFERENCE DESIGNATOR	DESCRIPTION	PART OR IDENTIFYING NUMBER	SPECIFICATION OR MANUFACTURER	QTY REQD
27		SCREW, PH 6-32 x 5/8	MS51957-31		32
28		CONNECTOR	863024-1	AMP	1
29		SCREW, PH 4-40 x 1 1/2	MS51957-23		2
30		SCREW, PH 4-40 x 5/16	MS51957-14		6
31		WASHER, FLAT NO. 6	MS15795-825		42
32		WASHER, SPLIT LOCK NO.6	MS35339-136		42
33		WASHER, FLAT NO. 4	MS15795-803		8
34		WASHER, LOCK NO. 4	MS35339-135		8
36		WASHER, LOCK NO. 8	MS35338-137		4
37		WASHER, FLAT NO. 8	MS15795-807		4
38		SCREW, PH 6-32 x 7/16	MS51957-29		8
39		SCREW, 8-32 x 7/16	MS51957-44		2
40		NUT, HEX NO. 6	MS35649-284		4
41		CABLE CLAMP 9/16	8917		4
42		STAND-OFF 1/4 x 1 1/4	8448		2
43	J1 (MATE)	CONNECTOR	3433N	ARROW-HART	1
44	IEEE (MATE)	CONNECTOR	3548-1000	3M	1
45		LIGHT, INDICATOR	508-8738-504	DIALIGHT	1
46		LIGHT, HOLDER	CLF28-190	IMLEC	1
47		ADAPTER PLATE	869862-1	KELTEC	1
48		SCREW, PH 6-32 x 5/16	MS51957-27		4
49		HEAT SINK COMPOUND	340	DOW-CORNING	AR
50		CONNECTOR, JACK	2002-5015-00	OMNI-SPECTRA	2
51		CCA,GPIB ADDRESS	870368-9	KELTEC	1

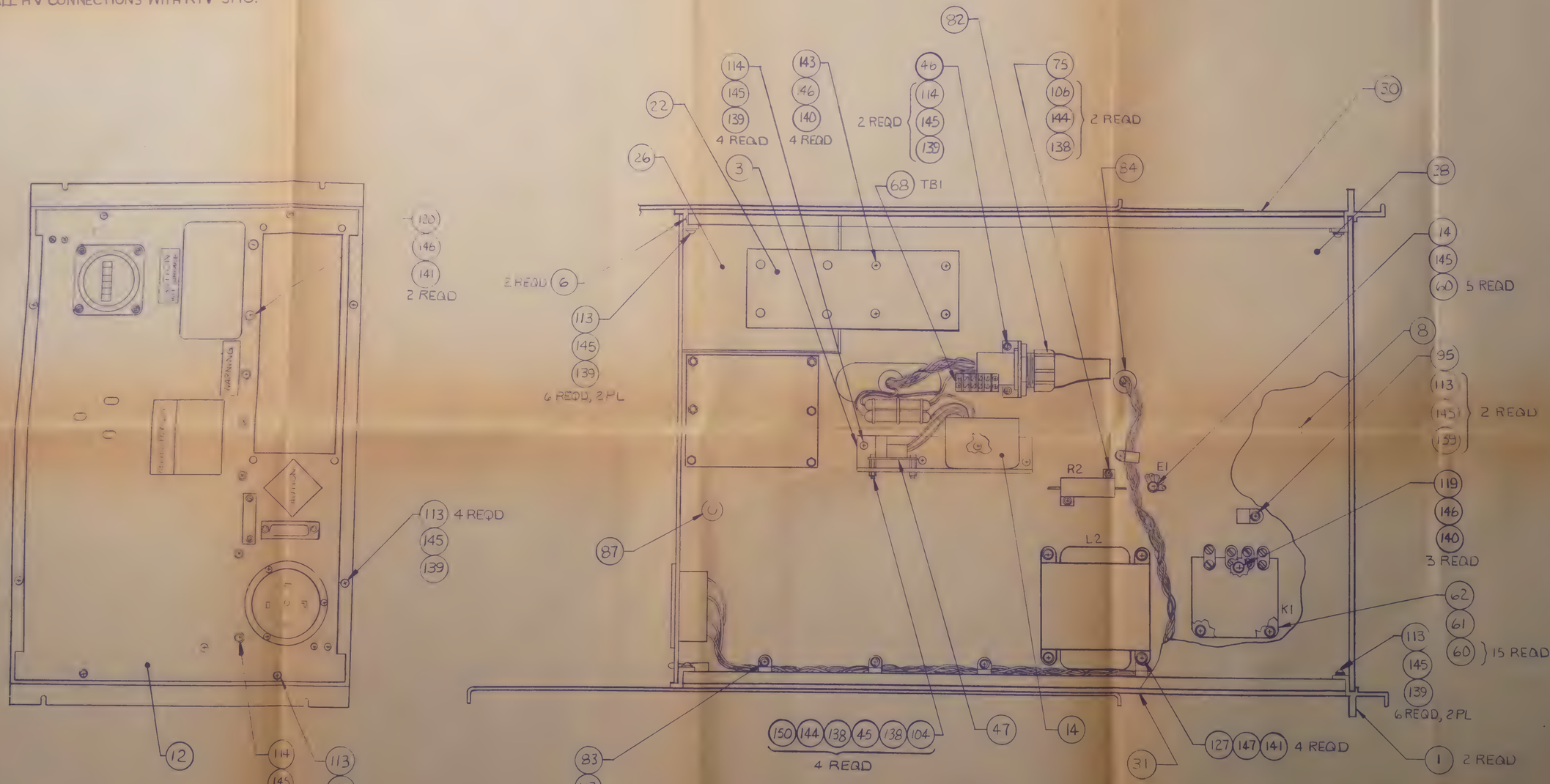
K E L T E C F L O R I D A
Code Indent. 09862
TITLE: UNIT ASSEMBLY PLB87D0681-9 REV: B
IJR630-200

ITEM NO	REFERENCE DESIGNATOR	DESCRIPTION	PART OR IDENTIFYING NUMBER	SPECIFICATION OR MANUFACTURER	QTY REQD
52		CABLE ASSEMBLY	870377-9	KELTEC	1
53		CABLE ASSEMBLY	870225-9	KELTEC	1
54	J102	CONNECTOR	DCM37S	ITT CANNON	1
55		SCREW LOCK, MALE	D20419	ITT CANNON	4
56		CONN. ADAPTER	2088-5013-00	OMNI-SPECTRA	1
57	P2	CONNECTOR	DBM25P	ITT CANNON	1
58		SCREW LOCK, FEMALE	D20418-2	ITT CANNON	2
59	K3	RELAY	W3B9CX-13	MAGNECRAFT	1

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
–		ENGRG RELEASE	7/14/11	RB
A		PER DCR 2007	11/5/12	RB

NOTES:

1. FOR SYSTEM SCHEMATIC SEE DWG 857501.
2. FOR WIRING DIAGRAM SEE 857509.
3. APPLY A SMALL DOT OF PAINT AS INDICATED, COLOR NOTED.
4. COAT ALL HV CONNECTIONS WITH RTV 3140.



-9 ASSY AS SHOWN

FOR SEPARATE PARTS LIST SEE PL 870169-9

-3	-2	-1	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL	REF DESIG
QTY. REQ'D.						LIST OF MATERIALS		
		1			KUR630-100			
		1			KUR630-200			
		1			UR630-100			
		1			UR630-200			

QTY.	USED ON	NEXT ASSY.
APPLICATION		

MATERIAL

FINISH

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INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-D-1000

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES

TOLERANCES

BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
UNDER 6	± .01	± .005	± 1/64
6-24 INCL	± .02	± .010	± 1/32
OVER 24	±	± .015	± 1/16
ANGLES	±1/2°		

APPROVALS, SIGNATURE & DATE	
DRAWN	H Clanahan 87-3-12
CHECKED	
DWG SUP	Ben Loy 87-7-11
MECH.	
ELECT.	L Rampurawala 7/11/87
MFG.	
Q. A.	
PROJ. APPD.	

KELTEC FLORIDA — A DIVISION OF AMSTAR TECHNICAL PRODUCTS COMPANY, INC.

CHASSIS ASSEMBLY BASIC

SIZE	CODE IDENT	
D	09062	870169

SCALE 1/2

SHEET 1 OF 3

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		SEE SHT 1		

DECK PLATE (REF)

103 2 REQD

88 2 REQD

105 144 138 2 REQD

57

73

K2

SECTION A-A

K2 MOUNTING

118 145 139

CAPACITOR SUPPLIED WITH ITEM 29.

127 141 141 147 153 FARSIDE

64 97 44 138 150

113 145 78 79 139

4 REQD 141 137 138

5

37

4

3 C 7

B

T1

T2

C4

A A

CR3

C3

K2

71 72 105 144 138 2 REQD

60 } 14 REQD

L1

K1

CR2

1

3 C 5

C C

D D

106

29 144

39 138 3 REQD

33

3 RED

3 YEL

CR5

K3

8 28 25

2 REQD 102 144 138

27

J3 59 58

138 144 102 2 REQD

141 147 131 65

32

84 (REF)

34 2 REQD

89 9 REQD L SIDE 9 REQD R SIDE

30 (REF) L SIDE

31 (REF) R SIDE

76 2 REQD

HARDWARE FURNISHED WITH SLIDES

CURRENT THERMAL OVERLOAD

HIGH VOLTAGE POWER

LOW VOLTAGE POWER

TIME DELAY STANDBY OPERATE

STANDBY OFF OPERATE REMOTE

11

110 4 REQD

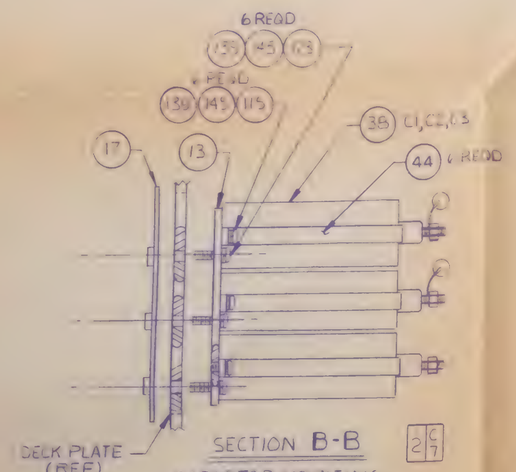
127 147 141 4 REQD

VIEW D-D

AIR DUCT/FAN MOUNT INSTRUCTIONS

SIZE	CODE IDENT NO.	870169
D	09062	
SCALE 1/2		SHEET 2

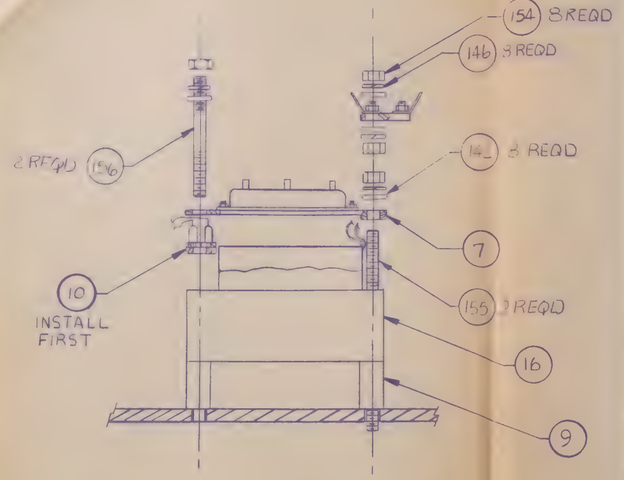
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		SEE SHT 1		



SECTION B-B

CAPACITOR MOUNTING INSTRUCTIONS

2 C 7



SECTION C-C

XFMR & COLLECTOR BRIDGE MOUNTIMG

NO SCALE

2 B 5

SIZE D	CODE IDENT NO. 09062	870169	
SCALE 1/2			SHEET 3 OF 3

PARTS LIST

TITLE: CHASSIS ASSY, BASIC

KELTEC FLORIDA
FORT WALTON BEACH FLORIDA

PL 870169-9

REV LTR A DATE

CODE IDENT 09062 | CONTRACT NO KUR, IJR360 | SHEET 1 OF 8 SHEETS

ITEM NO	QTY REQD	CODE IDENT	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MANUFACTURER	REF DES
1	2		MP-40086-6	HANDLE, RACK MOUNT	BUCKEYE	
2						
3	1		869720-1	BRACKET	KELTEC	
4	2		791306-1	TRIM, FRONT HORIZONTAL	KELTEC	
5	1		P6378	TRANSFORMER ASSY, T2	STANCOR	
6	2		MP40282-6	TRIM, REAR VERTICAL	BUCKEYE	
7	1		857920-9	COLLECTOR BRIDGE ASSY	KELTEC	
8	2		MP-40769-10	PANEL, TOP AND BOTTOM	BUCKEYE	
9	2		813813-1	TRANSFORMER, SUPPORT	KELTEC	
10	1		857210-9	COLLECTOR BRIDGE ASSY	KELTEC	
11	1		870176-9	FRONT PANEL ASSY	KELTEC	
12	1		870177-9	REAR PANEL ASSY	KELTEC	
13	1		857911	SUPPORT PLATE, CAPACITOR	KELTEC	
14	1		869719-9	CCA, GRID SUPPLY II, HV	KELTEC	
15						
16	1		85M0043	TRANSFORMER, COLLECTOR	KELTEC	T1
17	1		857206-1	PLATE, CAPACITOR	KELTEC	
18						
19						
20						

PARTS LIST	TITLE: CHASSIS ASSY, BASIC	KELTEC FLORIDA, FORT WALTON BEACH FLORIDA	PL 870169-9	REV LTR A, DATE
		CODE IDENT 09062	CONTRACT NO KUR, IJR360	SHEET 2 OF 8 SHEETS

ITEM NO	QTY REQD	CODE IDENT	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MANUFACTURER	REF DES
21						
22	1		73B0556-1	BRACE, HEAT SINK	KELTEC	
23						
24						
25	1		857220-9	HEAT SINK ASSY	KELTEC	
26	1		74D0108-9	HEAT SINK ASSY, TWT	KELTEC	
27	1		857910-9	HIGH VOLTAGE ASSY	KELTEC	
28	1		791325-1	PLATE, DECK	KELTEC	
29	1		791326-1	FAN (AID)	KELTEC	BL1
30	1		72C0736-1	PLATE, SIDE	KELTEC	
31	1		72C0736-2	PLATE, SIDE	KELTEC	
32	1		791324-1	AIR DUCT	KELTEC	
33	1		791323-1	AIR DUCT FAN MOUNTING	KELTEC	
34	1		791306-1	BRACE (MOD)	KELTEC	
35						
36						
37	1		73C0587-1	INDUCTOR ASSY	KELTEC	L1
38	3		CC569	CAPACITOR (1 uF, 10 kV)	HIGH ENERGY CORP	C1,2,3
39	1		791327	SCREEN, FAN	KELTEC	
40						

PARTS LIST	TITLE: CHASSIS ASSY, BASIC	KELTEC FLORIDA FORT WALTON BEACH FLORIDA	PL 870169-9	REV LTR A DATE
		CODE IDENT 09062	CONTRACT NO KUR, IJR360	SHEET 3 OF 8 SHEETS

ITEM NO	QTY REQD	CODE IDENT	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MANUFACTURER	REF DES
41						
42						
43						
44	6		10-055	MOUNTING BRACKET, FOOTED	HIGH ENERGY CORP	
45	4		376	STANDOFF (1/4 x 1/4)	KEYSTONE	
46	1		869759-1	BRACKET	KELTEC	
47	1		869723-9	CCA, GRID SUPPLY II ASSY	KELTEC	
48						
49						
50						
51						
52						
53						
54						
55	AR		RTV 732	SEALANT, SILICON, RTV	DOW CORNING	
56	AR		340	COMPOUND, THERMAL	DOW CORNING	
57	1		77M1P8	SOCKET, RELAY	AMPHENOL	XK2
58	1		DBM-21W1S	CONNECTOR	CANNON	J3
59	1		DM53744-25	CONTACT	CANNON	
60	34		MS351131-7	LUG, SOLDER (NO. 10)		

PARTS LIST	TITLE: CHASSIS ASSY, BASIC	KELTEC FLORIDA FORT WALTON BEACH FLORIDA	PL 870169-9	REV LTR A DATE
		CODE IDENT 09062	CONTRACT NO KUR, IJR360	SHEET 4 OF 8 SHEETS

ITEM NO	QTY REQD	CODE IDENT	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MANUFACTURER	REF DES
61	1		PM17DY-24V	RELAY (24V)	POTTER BRUMFIELD	K1
62	1		35D203	COVER, RELAY	POTTER BRUMFIELD	
63						
64	1		B391-10	DIODE BRIDGE	EDAL	CR3
65	1		AL-30-20	DIODE BRIDGE	EDAL	CR2
66						
67						
68	1		4-172	TERMINAL BLOCK	CINCH	TB1
69						
70						
71	1		87A0742-1	CAPACITOR (6100 uF, 50 V)	KELTEC	C3
72	1		VR3	CLAMP, CAPACITOR	MALLORY	
73	1		326XBX48P-300	RELAY, TIME DELAY	STRUTHERS-DUNN	K2
74						
75	1		RH50-5-OHM 1%	RESISTOR (5 OHM, 1%)	DALE	R2
76	2		CTN-124	CHASSIS SLIDE	ZERO	
77						
78	1		TA158	TIE ANCHOR	PANDUIT	
79	1		PLT-31M	TIE WRAP	PANDUIT	
80						

PARTS LIST	TITLE: CHASSIS ASSY, BASIC	KELTEC FLORIDA FORT WALTON BEACH FLORIDA	PL 870169-9	REV LTR A DATE
		CODE IDENT 09062	CONTRACT NO KUR, IJR360	SHEET 5 OF 8 SHEETS

ITEM NO	QTY REQD	CODE IDENT	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MANUFACTURER	REF DES
81						
82	1		863024-1	CONNECTOR	AMP	
83	5		8915	CABLE CLAMP (7/16)	AFCOM	
84	1		91109	GROMMET	HH SMITH	
85						
86						
87	1		91123	GROMMET	HH SMITH	
88	2		8110-SS-0440-7	STANDOFF (7/8)	AMATOM	
89	18		MS51959-28	SCREW, FH (6-32 x 3/8)		
90						
91						
92						
93						
94						
95	2		8913	CABLE, CLAMP (5/16)	AFCOM	
96						
97	1		MS51957-19	SCREW, PNH (4-40 x 3/4)		
98						
99						
100						

PARTS LIST	TITLE: CHASSIS ASSY, BASIC	KELTEC FLORIDA FORT WALTON BEACH FLORIDA	PL 870169-9	REV: A DATE
		CODE IDENT 09062	CONTRACT NO KUR, IJR360	SHEET 6 OF 8 SHEETS

ITEM NO	QTY REQD	CODE IDENT	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MANUFACTURER	REF DES
101	2		MS51957-23	SCREW, PNH (4-40 x 1-1/2)		
102	4		MS51957-13	SCREW, PNH (4-40 x 1/4)		
103	4		MS51959-16	SCREW, FH (4-40 x 7/16)		
104	6		MS51959-18	SCREW, FH (4-40 x 5/8)		
105	2		MS51957-14	SCREW, PNH (4-40 x 5/16)		
106	7		MS51957-15	SCREW, PNH (4-40 x 3/8)		
107	2		MS51957-16	SCREW, PNH (4-40 x 7/16)		
108	8		MS51957-17	SCREW, PNH (4-40 x 1/2)		
109						
110	4		MS51959-26	SCREW, FH (6-32 x 1/4)		
111						
112	3		MS51959-27	SCREW, FH (6-32 x 5/16)		
113	44		MS51957-28	SCREW, PNH (6-32 x 3/8)		
114	23		MS51957-29	SCREW, PNH (6-32 x 7/16)		
115	8		MS51957-31	SCREW, PNH (6-32 x 5/8)		
116						
117						
118	4		MS51957-30	SCREW, PNH (6-32 x 1/2)		
119	3		MS51957-43	SCREW, PNH (8-32 x 3/8)		
120	2		MS51957-45	SCREW, PNH (8-32 x 1/2)		

PARTS LIST	TITLE: CHASSIS ASSY, BASIC	KELTEC FLORIDA FORT WALTON BEACH FLORIDA	PL 870169-9	REV LTR A DATE
		CODE IDENT 09062	CONTRACT NO KUR, IJR360	SHEET 7 OF 8 SHEETS

ITEM NO	QTY REQD	CODE IDENT	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MANUFACTURER	REF DES
121	10		MS51957-46	SCREW, PNH (8-32 x 5/8)		
122	8		MS51957-51	SCREW, PNH (8-32 x 1-1/2)		
123	6		MS51957-33	SCREW, PNH (6-32 x 7/8)		
124						
125						
126						
127	9		MS51958-61	SCREW, PNH (10-32 x 3/8)		
128	4		MS51958-62	SCREW, PNH (10-32 x 7/16)		
129						
130	3		MS51958-65	SCREW, PNH (10-32 x 3/4)		
131	1		MS51958-66	SCREW, PNH (10-32 x 7/8)		
132						
133						
134						
135						
136						
137						
138	22		MS15795-803	WASHER, FLAT (NO. 4)		
139	75		MS15795-805	WASHER, FLAT (NO. 6)		
140	19		MS15795-807	WASHER, FLAT (NO. 8)		

PARTS LIST	TITLE: CHASSIS ASSY, BASIC	KELTEC FLORIDA FORT WALTON BEACH FLORIDA	PL 870169-9	REV LTR A DATE
		CODE IDENT 09062	CONTRACT NO KUR, IJR360	SHEET 8 OF 8 SHEETS

ITEM NO	QTY REQD	CODE IDENT	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MANUFACTURER	REF DES
141	16		MS15795-809	WASHER, FLAT (NO. 10)		
142	8		MS15795-810	WASHER, FLAT (1/4)		
143	4		MS51957-44	SCREW, PNH (8-32 x 7/16)		
144	22		MS35338-135	WASHER, SPLIT-LOCK (NO. 4)		
145	76		MS35338-136	WASHER, SPLIT-LOCK (NO. 6)		
146	11		MS35338-137	WASHER, SPLIT-LOCK (NO. 8)		
147	12		MS35338-138	WASHER, SPLIT-LOCK (NO. 10)		
148	8		MS35338-139	WASHER, SPLIT-LOCK (1/4)		
149						
150	7		MS35649-244	NUT, HEX (NO. 4)		
151	2		MS35649-264	NUT, HEX (NO. 6)		
152	2		MS35649-284	NUT, HEX (NO. 8)		
153	4		MS35650-304	NUT, HEX (NO. 10)		
154	8		MS35650-3254	NUT, HEX (1/4)		
155	2		855655-1	BOLT, TRANSFORMER	KELTEC	
156	2		855655-2	BOLT, TRANSFORMER	KELTEC	
157						
158						
159						
160						

REVISIONS				
STA	ZONE	DESCRIPTION	DATE	APPD
		ENGRG RELEASE	7/7/1	LB

NOTES:

1. UNLESS OTHERWISE SPECIFIED, ALL RESISTORS ARE IN OHMS AND 1/4W.
2. UNLESS OTHERWISE SPECIFIED, ALL CAPACITORS ARE IN MICROFARADS AND VOLTS.
3. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION(S), PREFIX WITH UNIT NUMBERS AND/OR SUBASSY NUMBER.

COMPONENT INDEX

A5 HTR/HELIX REG							
LAST USED	DELETED	LAST USED	DELETED	LAST USED	DELETED	LAST USED	DELETED
CR16,R26, Q7,T1,C4	CR11,12 R9,10						

COMPONENT INDEX

A1 CHASSIS		A2 HV SECTION		A3 HEATSINK		A4 CONTROL	
LAST USED	DELETED	LAST USED	DELETED	LAST USED	DELETED	LAST USED	DELETED
V1,CB2,K2,J2, L2,T2,CR5, R13,DS6,C3, BL1,S3,M2, P6,TB1		CR8,R12	R13–32 CR9–21	R20,Q14,CR2		CR22,R21, U1,C7,Q7	CR19

QTY	USED ON	NEXT ASSY.
	K1 @30–100/200	
	T1 @ 100–100/200	

APPLICATION

MATERIAL

FINISH

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TOLERANCES

BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
UNDER 6	± .01	± .005	± 1/64
6-24 INCL	± .02	± .010	± 1/32
OVER 24	±	± .015	± 1/16
ANGLES	±1/2°		

-3 QTY REQ'D	-2 QTY REQ'D	-1 QTY REQ'D	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL	REF DESIG
						LIST OF MATERIALS		

APPROVALS	SIGNATURE & DATE
DRAWN	88/9/6
CHECKED	
DWG SUP	88/7/1
MECH	
ELECT	6/21/88
MFG	
Q A	
PROJ. APPD	6/21/88

AMSTAR ELECTRONICS GROUP — KELTEC FLORIDA DEFENSE OPERATIONS

SCHEMATIC, SINGLE PHASE (CALIF INSTRU IEEE)

SIZE	CODE IDENT	
D	09062	87D1067-2

SCALE — SHEET 1 OF 3

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
—		SEE SHEET ONE		

SIZE	CODE IDENT NO.	
D	09062	87D1067-2
SCALE —		SHEET 2

COLL 1 -4330V
COLL 2 -6740V
CATH -10,400
C1 75-6V !

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET ONE		

A2 HIGH VOLTAGE

A2A3 CCA 870249-9

A2A2 CCA 870237-9

A3 HEATSINK

CCA 869723-9

POTTED H.V. SECTION CCA 86719-9

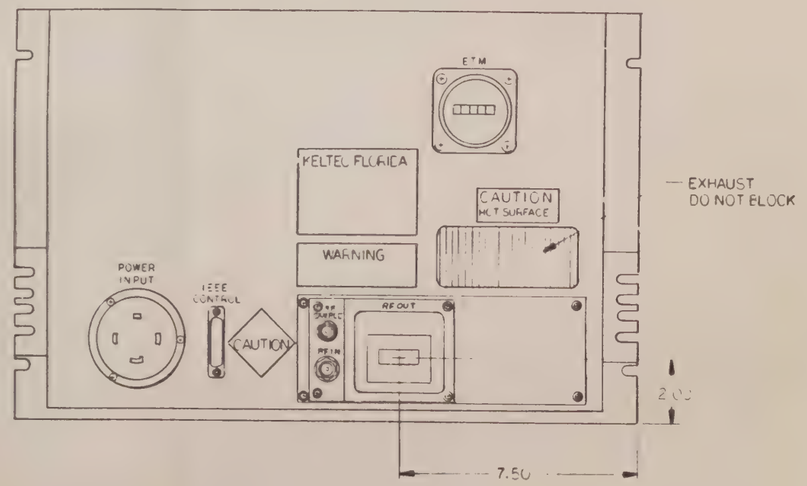
A2A2 CCA 870237-9 A2 HIGH VOLTAGE

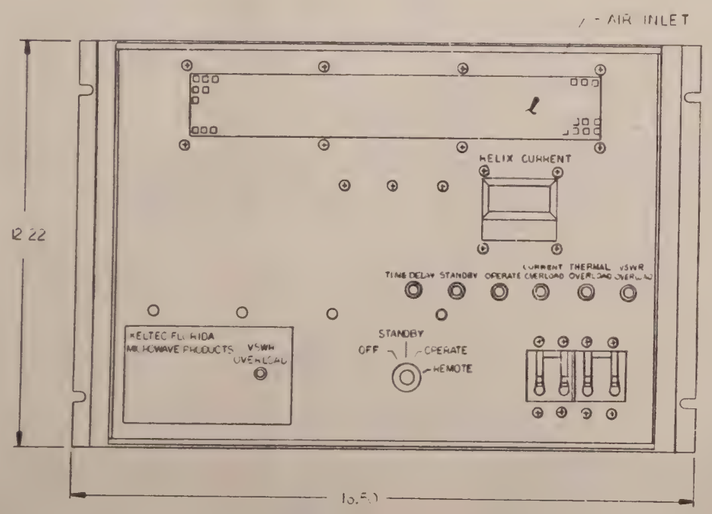
A5 HELIX HEATER REG 7400040

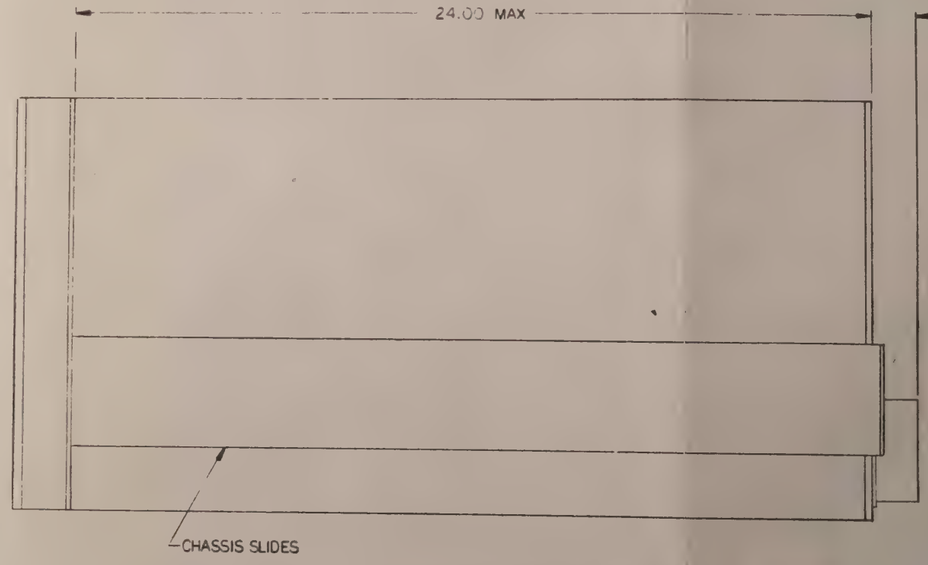
A1 CIRCUIT CONTROL

SIZE	CODE IDENT NO.	87D1067-2
D	09062	
SCALE —		SHEET 3

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
–		ENGRG RELEASE	7/14/92	KLB







-3 QTY REQ'D	-2 QTY REQ'D	-1 QTY REQ'D	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL	REF DESIG
						LIST OF MATERIALS		

QTY	USED ON	NEXT ASSY
	APPLICATION	

MATERIAL

FINISH

INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD D-1000

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES

TOLERANCES

BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
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ANGLES ±1/2°			

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APPROVALS SIGNATURE & DATE	
DRAWN	N. Cannahan 92-11-5
CHECKED	
DWG SUP	Bowling 92/11/12
MECH	
ELECT	L. Rampersaud 11-4-92
MFG.	
Q A	
PROJ APPD	

KELTEC FLORIDA — A DIVISION OF AMSTAR TECHNICAL PRODUCTS COMPANY, INC.

OUTLINE DRAWING, IJR630-200 OPTIONS E, V2

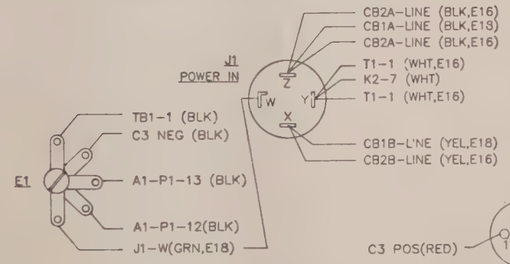
SIZE	CODE IDENT	
D	99062	87D1043

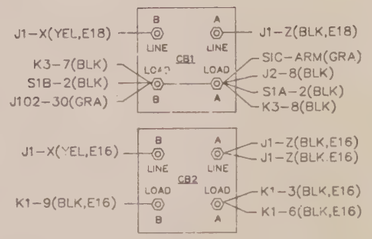
SCALE 1/2 — SHEET 1 OF 1

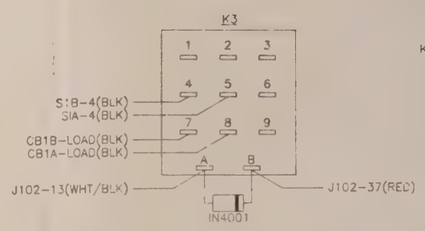
NOTES:

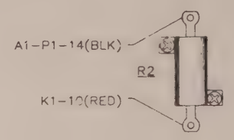
1. UNLESS OTHERWISE SPECIFIED, ALL WIRE TO BE E20, ALL WIRE TO BE PER MIL-W-16878/4.
2. JUMP TB1,2,3 IF TWT IS NOT USED.
3. INSTALL ALL OPTIONAL WIRING EXCEPT BLUE WIRE TO DS1-1.

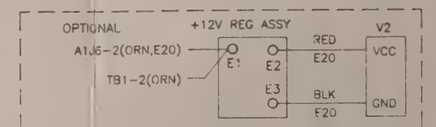
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
-		ENGR RELEASE	11/17	EJS

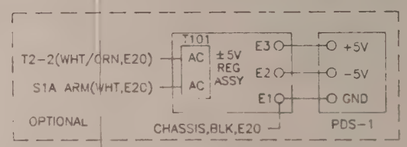


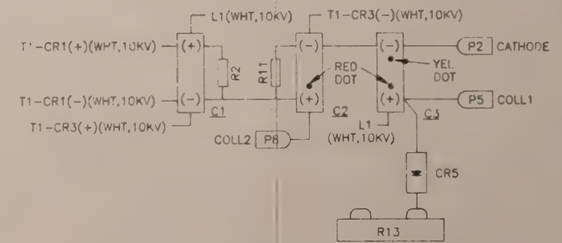


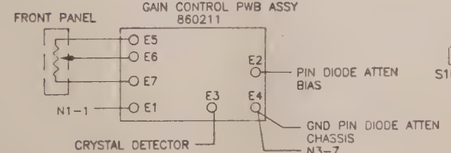


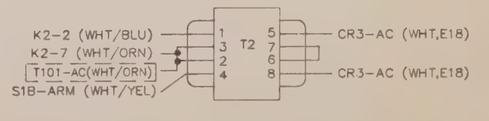


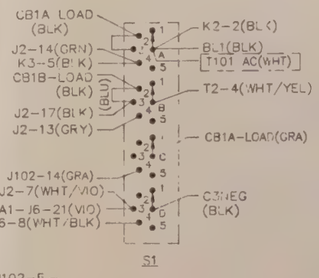


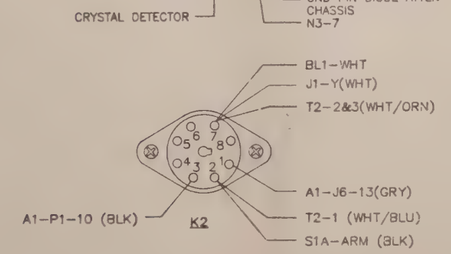


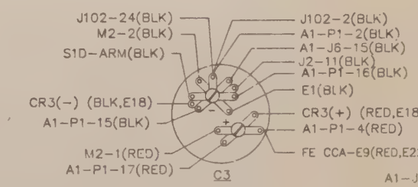


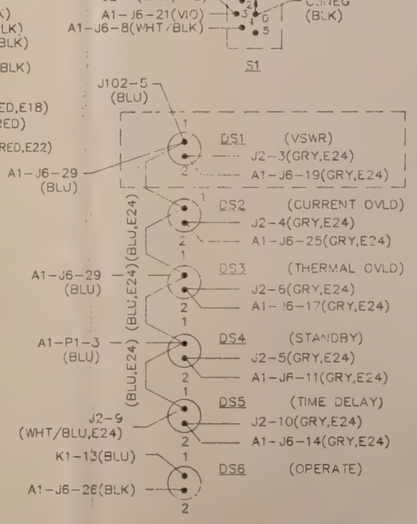


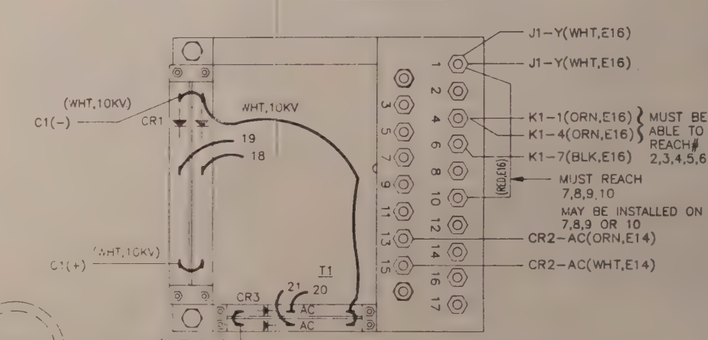


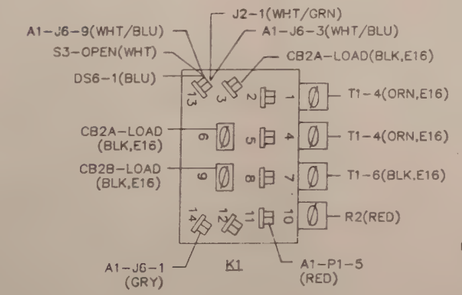


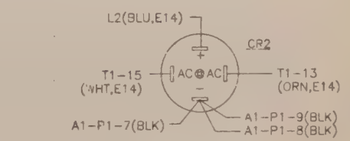


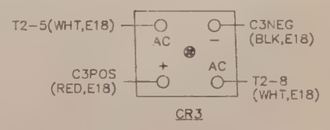


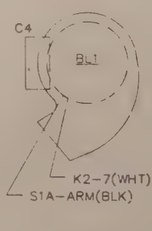


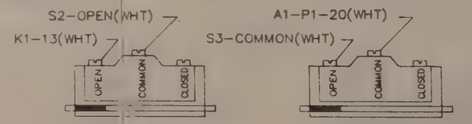


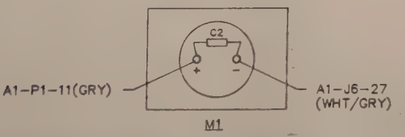


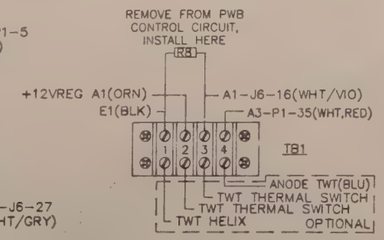


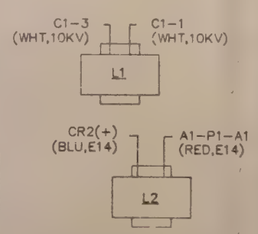












-3	-2	-1	ITEM NO	CODE IDENT	PART OR IDENSIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OF MATERIAL	REF DESIG
QTY REQ'D						LIST OF MATERIALS		

KUR630-200			
QUR630-200			
Q.:	USED ON	NEXT ASSY.	
APPLICATION			

MATERIAL

FINISH

INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-D-1000

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES			
BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
UNDER 6	± .01	± .005	± 1/64
6-24 INCL	± .02	± .010	± 1/32
OVER 24	±	± .015	± 1/16
ANGLES ±1/2°			

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APPROVALS	SIGNATURE & DATE
DRAWN	[illegible] 8/14/5
CHECKED	[illegible] 7/1/5
DWG SUP	[illegible] 8/14/5
MECH.	
ELECT	[illegible] 7/1/5
M F G	
Q A	
PROJ APPD	

AMSTAR ELECTRONICS GROUP — KELTEC FLORIDA DEFENSE OPERATIONS

WIRING DIAGRAM CHASSIS A1 WITH CI IEEE

SIZE	CODE IDENT	
D	09062	87D1069-2

SCALE — SHEET 1 OF 2

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
-		SEE SHEET ONE		

A3-P1 (DCM-37S) HEATSINK ASSY | A2-J4 (DCM-37P) HIGH VOLTAGE | A5-P1 (DCM-37PA) PWB HELIX/ HTR REG | A3-J5 (DCM-37S) HEATSINK ASSY

REFERENCE ONLY

J2 (DBM-25S) REMOTE

1	K1-13(WHT/GRN)
2	
3	DS1-2(GRA,24) OPTIONAL
4	DS2-2(GRA,24)
5	DS4-2(GRA,24)
6	DS3-2(GRA,24)
7	S1D-3(WHT/VIO)
8	A1-J6-28(WHT/BLU)
9	DS5-1(WHT/BLU,24)
10	DS5-2(GRA,24)
11	C3NEG(BLK)
12	
13	S1B-4 (GRY)
14	S1A-4(GRN)
15	
17	S1B-3(BLK)
18	CB1A-LOAD(BLK)

A4-P1 (DCM37PA) PWB CONTROL CIRCUIT | A1-J5 (DCM37S) FRONT PNL

1	1	K1-14(GRY)	OPTIONAL
2	2	A1-P1-18(ORN)	ET-12V,REG (ORN,E20)
3	3	K1-13(WHT/BLU)	
4	4	NC	
5	5	NC	
6	6	NC	
7	7	NC	
8	8	S1D-4(WHT/BLK)	
9	9	K1-13(WHT/BLU)	
10	10	A1-P1-1(WHT/GRY)	
11	11	DS4-2(GRY,E24)	
12	12	NC	
13	13	K2-1(GRY)	
14	14	DS5-2(GRY,E24)	
15	15	C3NEG(BLK)	
16	16	TB1-3(WHT/VIO)	
17	17	DS3-2(GRY,E24)	
18	18	A1-P1-19(ORN)	
19	19	DS1-2(GRY,E24) OPTIONAL	
20	20	A1-P1-6(GRN)	
21	21	S1D-3(VIO)	
22	22	NC	
23	23	(WHT,SHIELDED)	W1C2-17 (WHT)
24	24		BLK E20
25	25	DS2-2(GRY,E24)	
26	26	DS6-2(BLK)	
27	27	M1(-)(WHT/GRY)	
28	28	J2-8(WHT/BLK)	
29	29	DS3-1(BLU)	
30	30	J102-12(WHT/VIO)	
34	34	J102-4(BLU)	
36	36	J102-19(WHT/ORN)	
37	37	J102-6(VIO)	

A1-P1 (DBM-21W1S) CHASSIS | A3-J7 (DBM-21W1P) HEATSINK ASSY

A1-J6-10(WHT/GRY)	1	1
C3NEG(BLK)	2	2
DS4-1(BLU)	3	3
C3POS(RED)	4	4
K1-11(RED)	5	5
A1-J6-20(GRY)	6	6
CR2(-)(BLK)	7	7
CR2(-)(BLK)	8	8
CR2(-)(BLK)	9	9
K2-3(BLK)	10	10
M1(+)(GRY)	11	11
E1(BLK)	12	12
E1(BLK)	13	13
R2(BLK)	14	14
C3NEG(BLK)	15	15
C3NEG(BLK)	16	16
C3POS(RED)	17	17
A1-J6-2(ORN)	18	18
A1-J6-18(ORN)	19	19
S2-COM(WHT)	20	A1 A1
L2(RED,E14)	A1	

A2-P9 | A2-J9 H.V. SECTION

J102-19(WHT/RED)	1	1
J102-20(VIO)	2	2
	3	3
	4	4

J102 (IEEE MOD)

REAR PANEL — P1 — REMOTE

MOD1 IEEE CONTROL MODULE 8700880-9

GP1B ADDRESS 870367 A100 — P3

1	P2-1(WHT/GRN)
2	C3NEG(BLK)
3	P2-3(GRY,24)
4	A1-J6-34(BLU)
5	DS1-1(WHT/BLU)
6	A1-J6-37(VIO)
7	P2-7(WHT/VIO)
8	C3NEG(BLK)
9	P2-8(GRY)
10	P2-9(WHT/BLU,24)
11	P2-11(BLK)
12	A1-J6-30(WHT/VIO)
13	K3-A(WHT/BLK)
14	S1C-4(GRY)
17	A1-J6-23(WHT)
18	A1-J6-36(WHT/ORN)
19	A2-P9-1(WHT/RED)
20	A2-P9-2(VIO)
24	C3NEG(BLK)
25	C3NEG(BLK)
26	C3NEG(BLK)
27	C3NEG(BLK)
30	CB1B-LOAD(GRY)
32	C3NEG(BLK)
34	P2-5(GRY)
37	K3-B(RED)

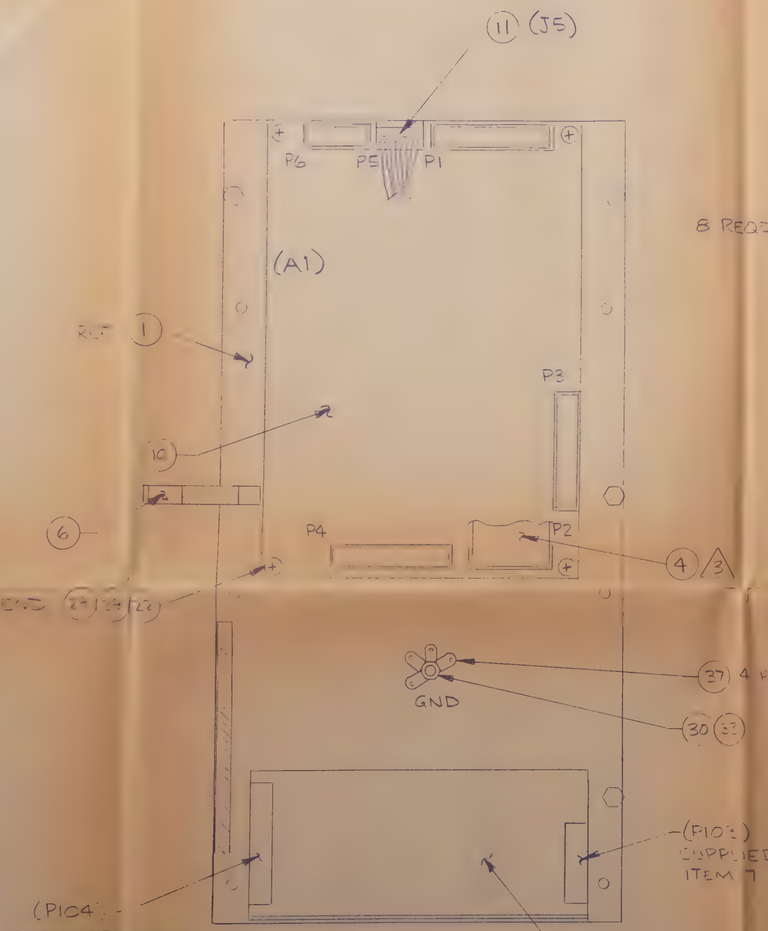
SIZE	CODE IDENT NO.	
D	09062	87D1069-2
SCALE		SHEET 2 OF 2

A & E SUPPLY HOUSE

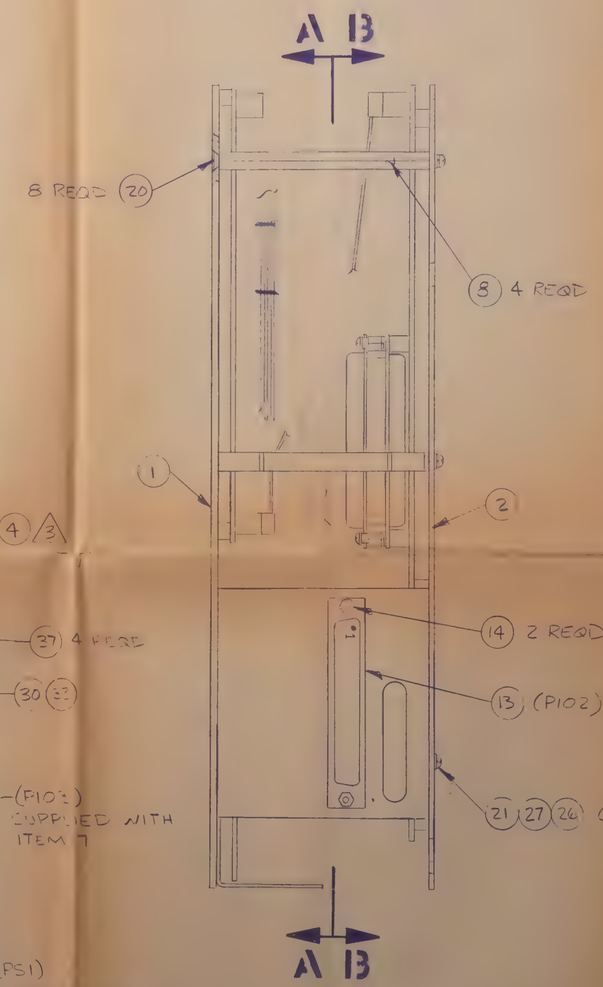
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
A		ENGINEERING RELEASE	9/1/87	RVD

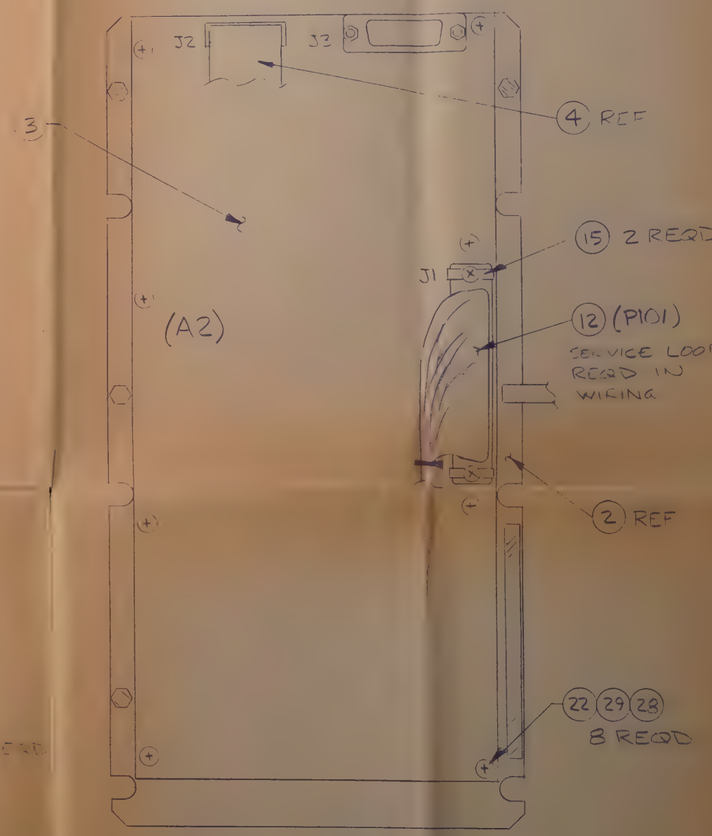
NOTES

1. IDENTIFY WITH 09062AS87D0880-[illegible] AS SHOWN. DO NOT MARK PART.
2. FOR WIRING DIAGRAM SEE 87D0880-[illegible]
3. ITEM [illegible] ASSY CONSISTS A1-P2 TO A2-J2.



VIEW A-A





VIEW B-B

FOR PARTS LIST SEE 87D0880-9

-3	-2	-1	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL	REF DESIG
QTY. REQ'D.						LIST OF MATERIALS		

			MATERIAL
			FINISH
1	R730	FINAL	
QTY.	USED ON	NEXT ASSY.	
APPLICATION			

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INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-D-1000

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES

TOLERANCES

BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
UNDER 6	± .01	± .005	± 1/64
6-24 INCL	± .02	± .010	± 1/32
OVER 24	±	± .015	± 1/16
ANGLES ±1/2°			

APPROVALS, SIGNATURE & DATE	
DRAWN	TRIPLETT 9/29/87
CHECKED	
DWG SUP	Bowling 9/1/87
MECH	[illegible]
ELECT.	
MFG	
Q.A.	
PROJ APPD	

KELTEC FLORIDA — A DIVISION OF AMSTAR TECHNICAL PRODUCTS COMPANY, INC.

ASSY, IEEE MODULE

SIZE	CODE IDENT	
D	09062	87D0880

SCALE 1/1 — SHEET 1 OF 1

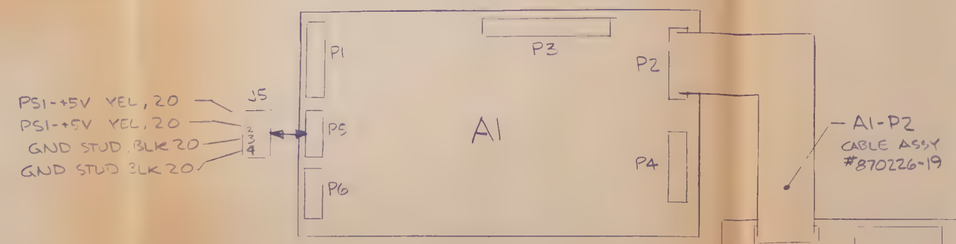
K E L T E C F L O R I D A

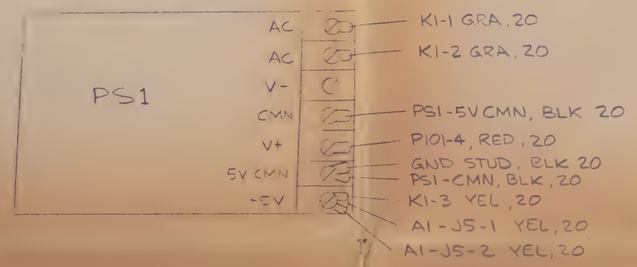
Code Indent. 09862

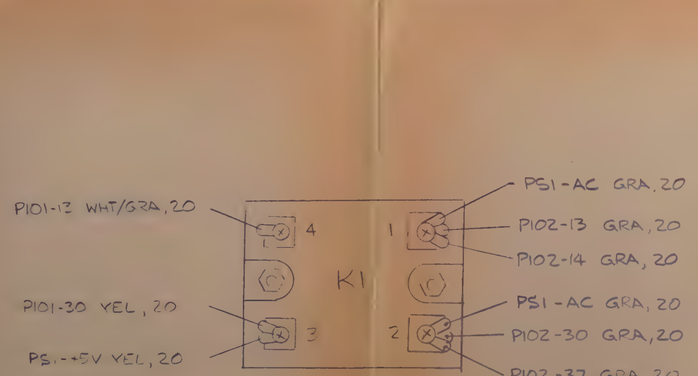
TITLE: ASSY, IEEE MODULE PLB7D0880-9 REV: A

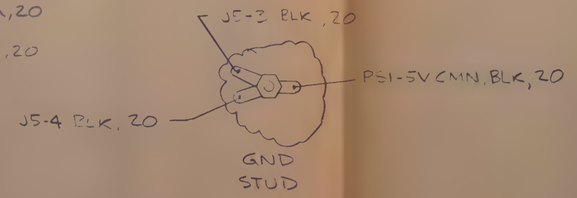
ITEM NO	REFERENCE DESIGNATOR	DESCRIPTION	PART OR IDENTIFYING NUMBER	SPECIFICATION OR MANUFACTURER	QTY REQD
1		BASE PLATE	87D0877-1	KELTEC	1
2		MOUNTING PLATE	87D0878-1	KELTEC	1
3	A2	CCA, I/O	870223-9	KELTEC	1
4		CABLE ASSY	870226-19	KELTEC	1
5		CONNECTOR PLATE	87C0913-1	KELTEC	1
6		MOUNT, CONNECTOR	87C1319-1	KELTEC	1
7	PS1	POWER SUPPLY	LVT-38E-144	LAMBDA	1
8		STAND OFF, HEX 1/4"	8238-A-0440	AMATOM	4
10	A1	P.C. ASSY, CPU	4995-737-1	CALIF. INST.	1
11	J5	CONNECTOR	09-50-3041	MOLEX	1
12	P101	CONNECTOR	DCM37S	ITT CANNON	1
13	P102	CONNECTOR	DCM37P	ITT CANNON	1
14		SCREW LOCK, FEMALE	D20418-2	ITT CANNON	2
15		SCREW LOCK, MALE	D20419	ITT CANNON	2
20		SCREW, FH 4-40 X 5/16	MS24693-C3		8
21		SCREW, PH 4-40 X 3/8	MS51957-15		6
22		SCREW, PH 6-32 X 5/16	MS51957-27		12
23		SCREW, FH M3 X 6MM	NO.965ST	METRIC & MIL-STD	2
26		WASHER, FLAT NO. 4	NAS620C-4L		6
27		WASHER, SPLIT-LOCK NO. 4	MS35338-135		6
28		WASHER, FLAT NO. 6	NAS620C-6L		18
29		WASHER, SPLIT-LOCK NO. 6	MS35338-138		18
30		WASHER, INT. LOCK NO.6	MS35333-71		1
33		NUT, HEX NO. 6	MS35649-264		1
37		LUG NO. 6	75-.144	ZIERICK	4

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD



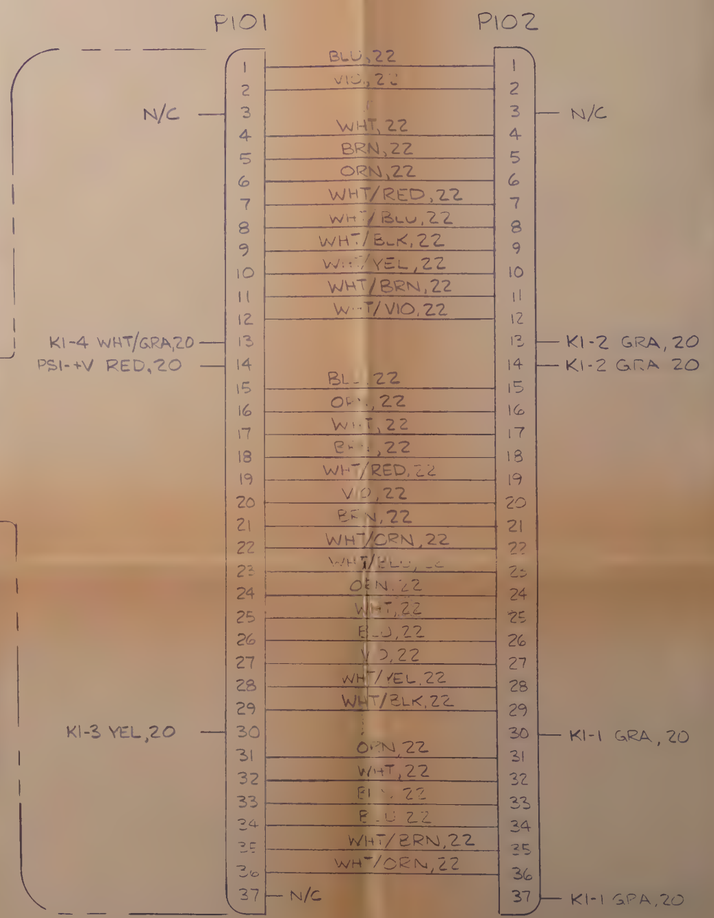






A2

J1



-3	-2	-1	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL	REF DESIG
QTY. REQ'D.								

LIST OF MATERIALS

			MATERIAL
			FINISH
1	6/30/2000	87D0879-9	
QTY.	USED ON	NEXT ASSY.	
APPLICATION			

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TOLERANCES

BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
UNDER 6	± .01	± .005	± 1/64
6 24 INCL	± .02	± .010	± 1/32
OVER 24	±	± .015	± 1/16
ANGLES ±1/2°			

APPROVALS, SIGNATURE & DATE	
DRAWN	TRIPLETT 87/10/1
CHECKED	
DWG SUP	
MECH.	
ELECT.	
MFG	
Q.A.	
PROJ. APPD	

KELTEC FLORIDA — A DIVISION OF AMSTAR TECHNICAL PRODUCTS COMPANY, INC.

WIRING DIAGRAM, IEEE MODULE

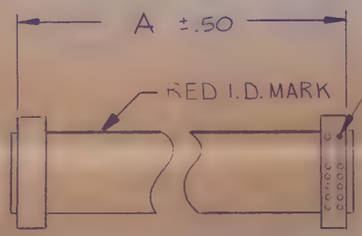
SIZE	CODE IDENT	
D	09062	87D0879

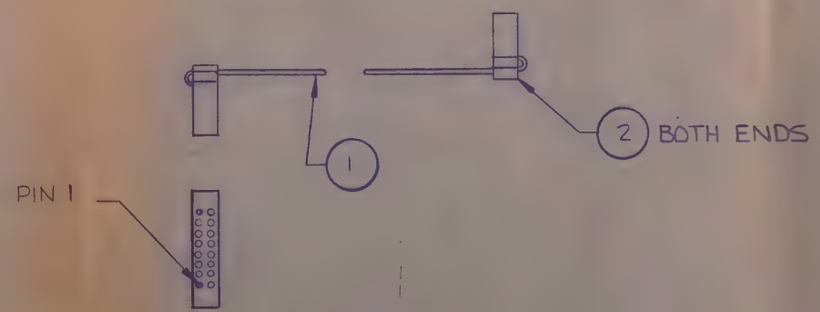
SCALE NONE — SHEET 1 OF 1

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
Ø		PRODUCTION RELEASE	87/6/1	RLB
A		PER ECN 2131	7-17-87	LLB
B		PER DCNN° 1391	88/1/6	AR LLB

NOTES:

1. IDENTIFY WITH 09062-ASSY-870226-9 REV [ ] & APPLY APPROP REV LTR PER MIL-STD-130. DO NOT MARK PART.





FOR SEPARATE PARTS LIST SEE PL870226-9;19

-3	-2	-1	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL	REF DESIG
QTY. REQ'D.						LIST OF MATERIALS		

A DIMENSION	
-9	15.00
-19	10.00

MATERIAL

FINISH

DASH	QTY.	USED ON	NEXT ASSY.
-19	1	8700880-9	8700880-9
-9	1	870231-7	870230-7

APPLICATION

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INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-D-1000

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES

TOLERANCES

BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
UNDER 6	± .01	± .005	± 1/64
6-24 INCL	± .02	± .010	± 1/32
OVER 24	±	± .015	± 1/16
ANGLES ±1/2°			

APPROVALS. SIGNATURE & DATE	
DRAWN	JAMES 87/4/29
CHECKED	LLB
DWG SUP	Bennett 87/5/1
MECH.	
ELECT.	
MFG.	
Q.A.	
PROJ. APPD.	

KELTEC FLORIDA — A DIVISION OF AMSTAR TECHNICAL PRODUCTS COMPANY, INC.

ASSEMBLY, CABLE

SIZE	CODE IDENT	
C	09062	870226

SCALE 1:1 | R. 25-20 | SHEET 1 OF 1

K E L T E C F L O R I D A

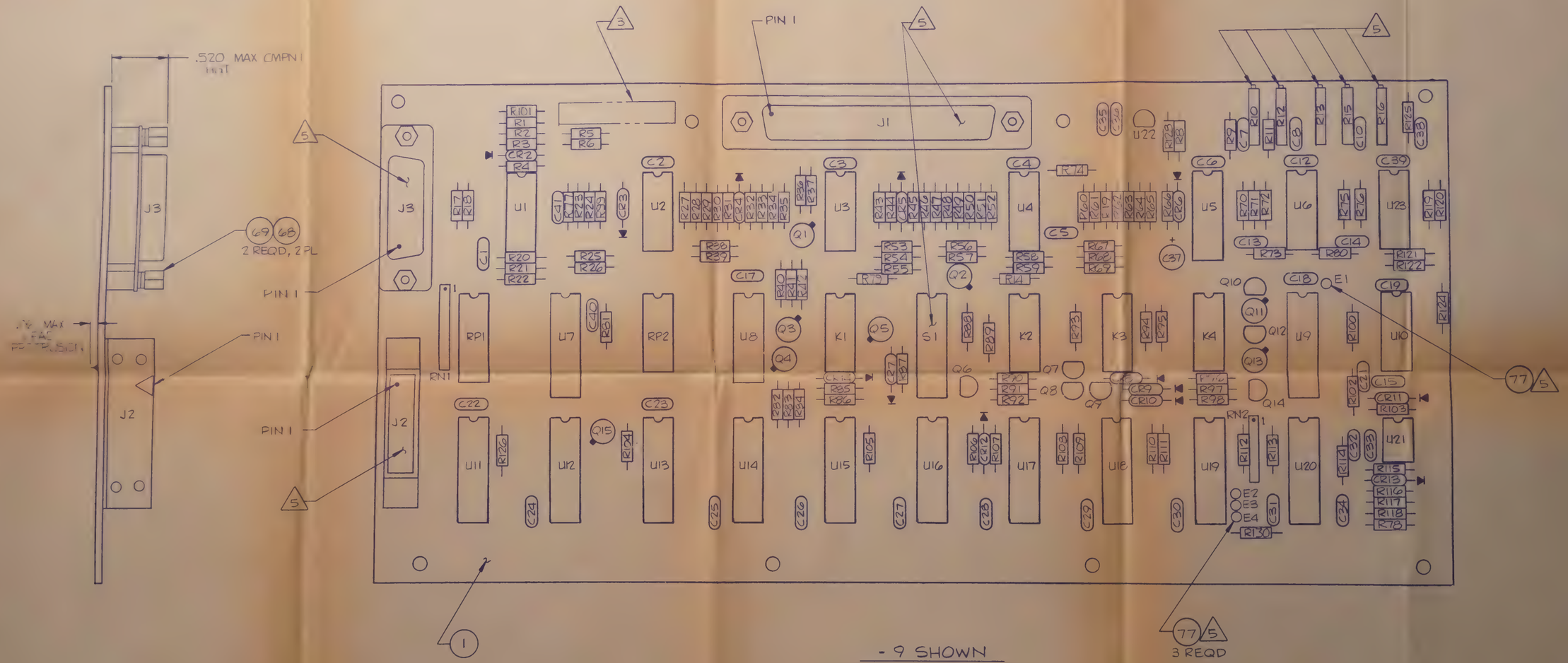
Code Indent. 09062

TITLE: CABLE ASSEMBLY PL870226-19 REV: B

ITEM	REFERENCE DESIGNATOR	DESCRIPTION	PART OR IDENTIFYING NUMBER	SPECIFICATION OR MANUFACTURER	QTY REQD
		CABLE,FLAT,26 AWG,16 CONDUCTOR	3801/16	3M	11"
		CONNECTOR,SOCKET,16 PIN	3452-6016	3M	2

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
Ø		PRODUCTION RELEASE	87/5/10	NKB
A		REV PER ECN Nº 2[illegible]	87/6/2	RKB
B		REV PER ECN N°2157, 1156, C1, C2 & 1499	87/7/1	RKB
C		PER DCN 2047 VR WH	88-03-22	RKB

NOTES:
1. ASSEMBLE PER MIL-STD-454, REQT 17.
2. FOR SCHEMATIC DIAGRAM SEE 870228.
3. IDENTIFY PER MIL-STD-130 USING INK PER MIL-I-43553, COLOR BLK, COLOR Nº 37038 PER FED-STD-595; ALL CHARACTERS TO BE .12 HIGH: APPLY APPROP DASH Nº, REV LTR & SERIAL Nº IN APPROX AREA SHOWN.
4. APPLY CONFORMAL COAT PER 850146 BOTH SIDES & EDGES.
5. AREAS INDICATED TO BE FREE OF CONFORMAL COAT.



- 9 SHOWN

FOR SEPARATE PARTS LIST SEE PL870223-9

-3	-2	-1	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL	REF DESIG
QTY REQ'D						LIST OF MATERIALS		
1	870231-9	870230-9						
QTY.	USED ON	NEXT ASSY.						

APPLICATION

MATERIAL

FINISH

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INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-D-1000

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES

TOLERANCES

BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
UNDER 6	± .01	± .005	± 1/64
6-24 INCL	± .02	± .010	± 1/32
OVER 24	±	± .015	± 1/16
ANGLES ±1/2°			

APPROVALS, SIGNATURE & DATE	
DRAWN	JJAMES87/5/7
CHECKED	MGFILION 87-05-13
DWG SUP	Bonnie 87-05-13
MECH.	
ELECT.	
MFG.	
Q.A.	
PROJ. APPD.	

KELTEC FLORIDA — A DIVISION OF AMSTAR TECHNICAL PRODUCTS COMPANY, INC.

CCA, I/O

SIZE	CODE IDENT	
D	09062	870223

SCALE 2:1 | IEEE | SHEET 1 OF 1

KELTEC FLORIDA
Code Ident. 09862
TITLE: CDA, I/O PL970223-9 REV: C

ITEM NO	REFERENCE DESIGNATOR	DESCRIPTION	PART OR IDENTIFYING NUMBER	SPECIFICATION OR MANUFACTURER	QTY REQD
1		PWB, IEEE I/O BE	970220-1	KELTEC	1
3	J1	CONNECTOR, 37 PIN	DCM37P	ITT CANNON	1
4	J3	CONNECTOR, 15 PIN	DAM15P	ITT CANNON	1
5	J2	CONNECTOR, 16 PIN	3M3-2502	3M	1
7	U2	IC	[illegible]	[illegible]	1
8	U7	IC	[illegible]	[illegible]	1
9	U8	IC	[illegible]	[illegible]	1
10	U20	IC	[illegible]	[illegible]	1
11	U5	IC	[illegible]	[illegible]	1
12	U11-16	IC	[illegible]	[illegible]	6
13	U17-19	IC	[illegible]	[illegible]	3
14	U21	IC	[illegible]	[illegible]	1
15	U9	IC	[illegible]	[illegible]	1
16	U6,U10,U23	IC	LM124	MOTOROLA	3
17	U22	IC	UA78L12LP	T.I.	1
18	U1,3,4	IC	LM339	NATIONAL	3
19	K1-4	RELAY	W171D19-5	[illegible]	4
21	Q10,12	TRANSISTOR	PE3850	FAIRCHAILD	2
22	Q6-9,14	TRANSISTOR	VN2222KM	SILICONIX	5
23	Q1-5,11,13,15	TRANSISTOR	2N2222A		8
28	C3,4,6-8,10,12,17,18,22-33, 38-41	CAP., .1UF/50V	C222C104M	CENTRALAB	27
29	C34	CAP., 220PF/50V NPO	DM15220J	CENTRALAB	1
30	C13-15,21,26	CAP., .01UF/50V	[illegible]	[illegible]	5
31	C27	CAP., 10UF/35V	T368A105M035AS	KEMET	1

K E L T E C F L O R I D A
Code Ident. 09062
TITLE: CCA, I/O PL870203-9 REV: C

ITEM NO	REFERENCE DESIGNATOR	DESCRIPTION	PART OR IDENTIFYING NUMBER	SPECIFICATION OR MANUFACTURER	QTY REQD
32	C75	CAP., .22UF/50V	M39014/02-1279	MIL-C-39014	1
33	C1,C5	CAP., .47UF/50V	M39014/02-1298	MIL-C-39014	2
36	CR2-7,12,14	DIODE	1N4148		9
37	CR8-12	DIODE, ZENER	1N746		5
41	R119	RES., 10M	RNF55J1005F		1
42	R10,12,13,15,16	RES., POT, 5K	3386P-1-502	BOURNS	5
43	R19,41,71,72,73,80,84,86,96	RES., 1K, 1/4W	RLR07C1021FS	MIL-R-39017	16
	98,99,104,106,107,108,109				
44	R3,11,29,31,37,38,45,47,58	RES., 100K, 1/4W	RLR07C1003FS	MIL-R-39017	19
	61,62,73,74,75,78,102				
45	R26,39,48,49,65	RES., 10M, 1/4W	RLR07C1005FS	MIL-R-39017	5
46	R88,R91,105,109,117	RES., 1.2K, 1/4W	RLR07C1221FS	MIL-R-39017	13
47	R1,7,9,21,40,57,77,78,90,93	RES., 10K, 1/4W	RLR07C1002FS	MIL-R-39017	21
	95,97,98,100,108,111,112,				
	115,117,125				
48	R42,89,92,95	RES., 330 OHM, 1/4W	RLR07C3300FS	MIL-R-39017	4
49	R103	RES., 4.7K, 1/4W	RLR07C4721FS	MIL-R-39017	12
50	R17,18,23,33,35,44,50,52,53,	RES., 3K, 1/4W	RLR07C3001FS	MIL-R-39017	13
	60,63,94,118				
51	R7,27,28,31,46,51,55,114	RES., 1M, 1/4W	RLR07C1004FS	MIL-R-39017	10
52	R22,R116	RES., 5.6K, 1/4W	RLR07C5601FS	MIL-R-39017	2
53	R2,R6,R24,R65	RES., 3.9K, 1/4W	RLR07C3901FS	MIL-R-39017	2
54	R48,R20	RES., 680 OHM, 1/4W	RLR07C6800FS	MIL-R-39017	2
55	R22,59	RES., 1.5K, 1/4W	RLR07C1501FS	MIL-R-39017	2

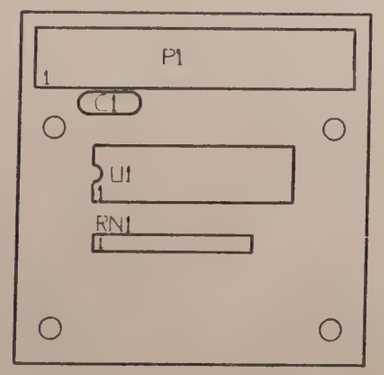
KELTEC FLORIDA
Code Ident. 07852
TITLE: SSA, I/O PLB70223-9 REV: C

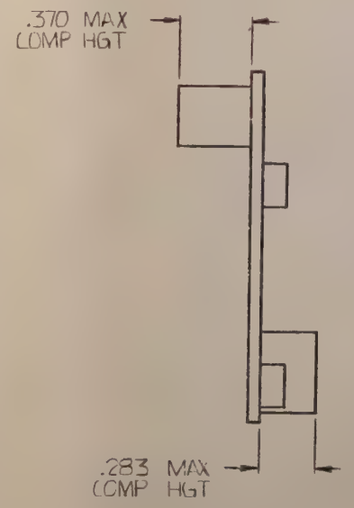
ITEM NO	REFERENCE DESIGNATOR	DESCRIPTION	PART OR IDENTIFYING NUMBER	SPECIFICATION OR MANUFACTURER	QTY REQD
56	R4,R5	RES., 560 OHM, 1/4W	RLR07C561GS	MIL-R-39017	2
57	R44	RES., 1.3K, 1/4W	RLR07C1301GS	MIL-R-39017	1
58	R24,6,26	RES., 1.5K, 1/4W	RLR07C152GS	MIL-R-39017	3
59	R43,54	RES., 2K, 1/4W	RLR07C202GS	MIL-R-39017	2
60	RP2,RP1	RES., DIP ARRAY, 10T	896-3-R10K	BECKMAN	2
61	RP4	RES., DIP ARRAY, 100K	1050134	ALLEN BRADLEY	1
62	RP3	RES., DIP ARRAY 100K	1060134	ALLEN BRADLEY	1
63	RP5,9	RESISTOR 1.5K, 1 W	RLR07C152GS	MIL-R-39017	2
67	S1	SWITCH DIP RDDWSP	76B01B	GRAYHILL	1
68		STANDOFF .250 LG	MS20426AW3	TEM	3
69		SCREW 6-32	0220A6-2	[illegible]	3
70	C1-5A	SOCKET STRIP .4 RESISTOR	460-1001-T-12	BERGI	4

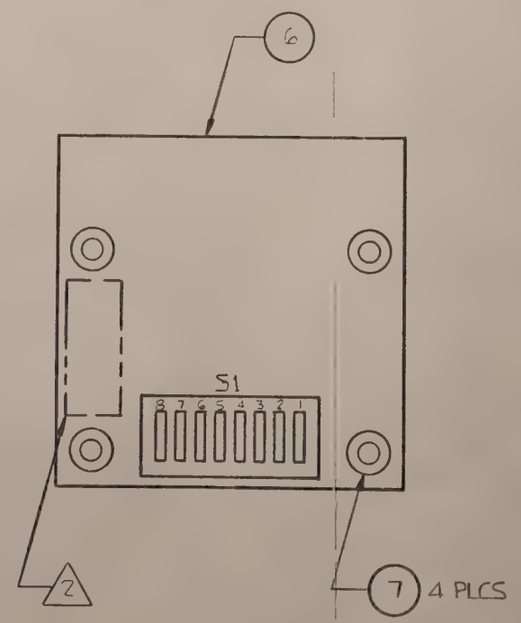
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
Ø		PRODUCTION RELEASE	87/6/10	DB
A		PER ECN 2170, MS	9-2-87	LLB
B		PER DCN 1149 JR DCC	10-6-87	DB

NOTES

1. ASSEMBLE PER MIL-STD-454, REQT. 17.
2. IDENTIFY PER MIL-STD-130 USING INK PER MIL-I-43553, COLOR BLK (N°37038) PER FED-STD-595; ALL CHARACTERS TO BE .12 HIGH: APPLY APPROP DASH N°, REV LTR & SERIAL N° IN APPROX AREA SHOWN.







FOR SEPARATE PARTS LIST SEE PL870368-9

-3 QTY. REQ'D.	-2 QTY. REQ'D.	-1 QTY. REQ'D.	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL	REF DESIG
						LIST OF MATERIALS		

QTY.	USED ON	NEXT ASSY.
	APPLICATION	

MATERIAL

FINISH

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INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-D-1000

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES

TOLERANCES

BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
UNDER 6	± .01	± .005	± 1/64
6-24 INCL	± .02	± .010	± 1/32
OVER 24	±	± .015	± 1/16
ANGLES	±1/2°		

APPROVALS, SIGNATURE & DATE	
DRAWN	MGFILION 87-06-10
CHECKED	D HAYDEN 87/6/10
DWG SUP	
MECH.	
ELECT.	D. HAYDEN 87/6/10
MFG.	
Q.A.	
PROJ. APPD.	

KELTEC FLORIDA — A DIVISION OF AMSTAR TECHNICAL PRODUCTS COMPANY, INC.

CCA, GPIB ADDRESS

SIZE	CODE IDENT	
C	09062	870368

SCALE 2/1 — SHEET 1 OF 1

3600318

PARTS LIST

TITLE: CCA, GPIB ADDRESS

KELTEC FLORIDA
FORT WALTON BEACH FLORIDA

PL 870368-9

REV LTR B DATE

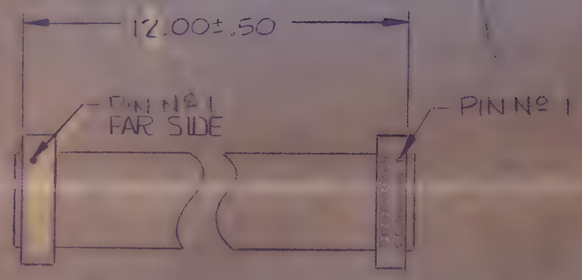
CODE IDENT 09062 | CONTRACT NO R630-10/20 | SHEET 1 OF 1 SHEETS

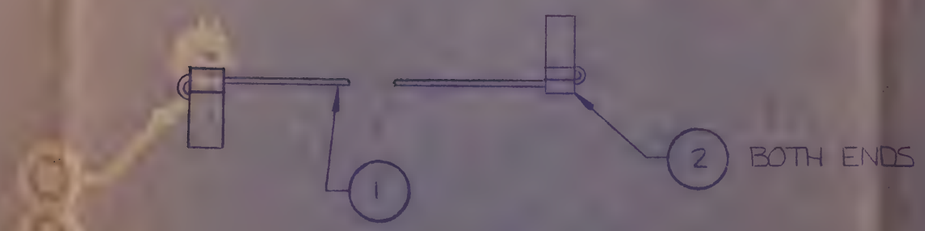
ITEM NO	QTY REQD	CODE IDENT	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MANUFACTURER	REF DES
1	1		74HC541	IC, NON-INVERTING BUFFER	T. I.	U1
2	1		708A-22K	SERIES 708 R NETWORK, SIP	ALLEN BRADLEY	RN1
3	1		3593-6003	CONNECTOR, MALE (26 PIN)	3M	P1
4	1		76RSB08	SWITCH, ROCKER, DIP, RECESSED	GRAYHILL	S1
5	1		CZ20C104M	CAPACITOR, CER. (.1, 50 V)	CENTRALAB	C1
6	1		870367-1	PWB, GPIB ADDRESS	KELTEC	
7	4		KFSE-440-4	STANDOFF	PEM	
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

NOTES:

1. IDENTIFY WITH 09062-ASSY-870377-9 REV LTR & APPLY APPROP REV LTR PER MIL-STD-130. DO NOT MARK PART.

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
D		PRODUCTION RELEASE	8706/19	DB





FOR SEPARATE PARTS LIST SEE PL870377-9

-3 QTY REQ'D.	-2 QTY REQ'D.	-1 QTY REQ'D.	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL	REF DESIG
						LIST OF MATERIALS		

QTY	1	2
USED ON		
NEXT ASSY		
APPLICATION		

MATERIAL

FINISH

INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-D-1000

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES

TOLERANCES

BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
UNDER 6	± .01	± .005	± 1/64
6 TO 24 INCL	± .02	± .010	± 1/32
OVER 24	±	± .015	± 1/16
ANGLES ± 2°			

APPROVALS, SIGNATURE & DATE		
DRAWN	MGFILION	8706-11
CHECKED	B.L. TRIPLET	8706-11
DWG SUP		8706/11
MECH		
ELECT	I Rampurawala	6-18/87
MFG		
Q.A		
PROJ APPD		

KELTEC FLORIDA
A DIVISION OF AMSTAR TECHNICAL PRODUCTS COMPANY, INC.

ASSEMBLY, CABLE

SIZE	CODE IDENT	
C	09062	870377

SHEET 1

KELTEC FLORIDA
Code Ident. 89062

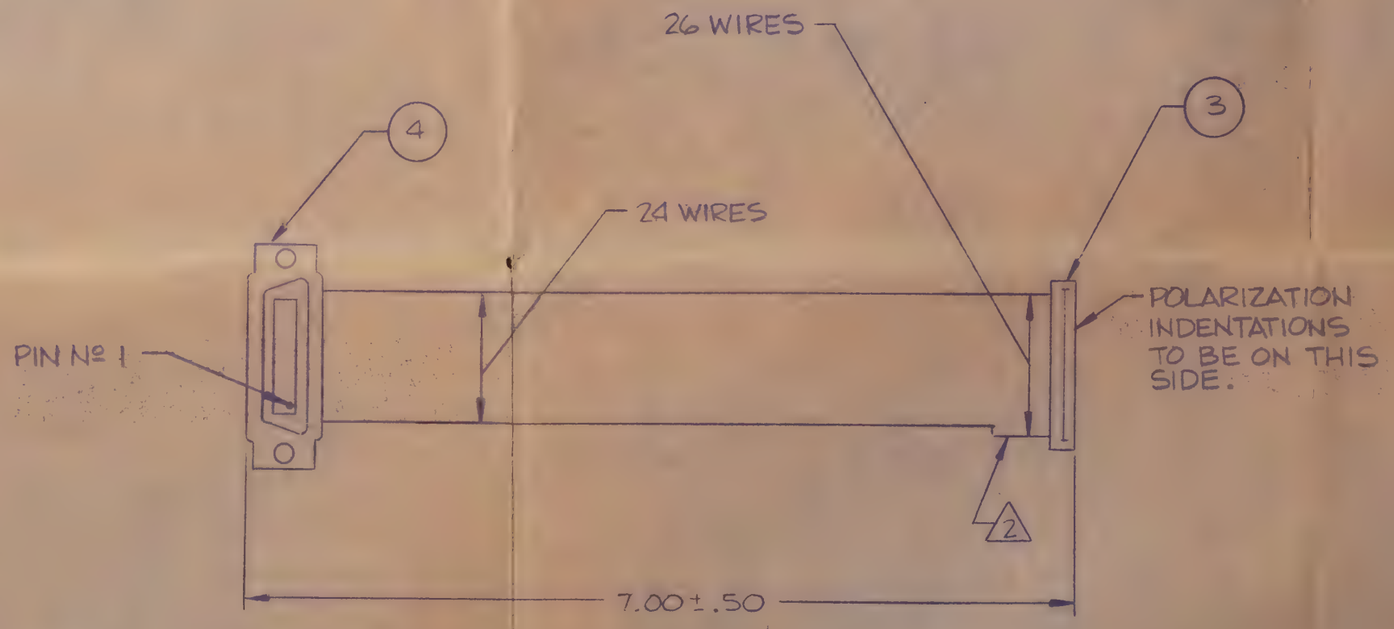
TITLE: ASSEMBLY, CABLE PL97377-9 REV B

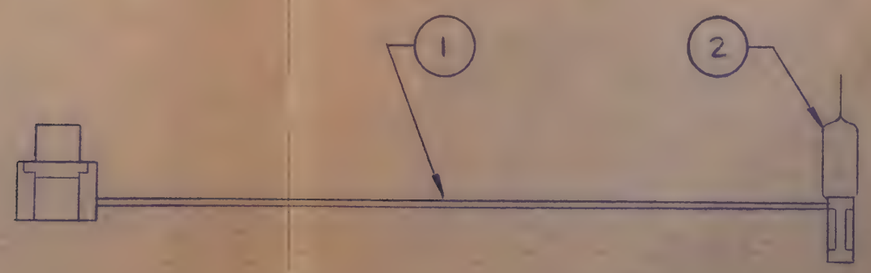
ITEM NO.	REFERENCE DESIGNATOR	DESCRIPTION	PART OR IDENTIFYING NUMBER	SPECIFICATION OR MANUFACTURER	QTY REQD
1		CABLE,FLAT,26 AWG,26 CONDUCTOR	3531/26	3M	1.0"
2		CONNECTOR, SOCKET, 26 PIN	3398-6026	3M	2

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
Ø		PRODUCTION RELEASE	87/5/1	RWB

NOTES:

1. IDENTIFY WITH 09062-ASSY-870225-9 REV [ ] & APPLY APPROP REV LTR PER MIL-STD-130. DO NOT MARK PART.
2. WIRE Nos 1 & 2 TO BE CUT BACK TO WITHIN .50 OF ITEM 3 (CONNECTOR).





FOR SEPARATE PARTS LIST SEE PL870225-9

-3	-2	-1	ITEM NO.	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL	REF DESIG
QTY. REQ'D.								

LIST OF MATERIALS

1	870231-7	870220-7
QTY.	USED ON	NEXT ASSY
APPLICATION		

MATERIAL

FINISH

INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-D-1000

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES

TOLERANCES

BASIC DIMENSION	DECIMALS 2 PLACE	DECIMALS 3 PLACE	FRACTIONS
UNDER 6	± .01	± .005	± 1/64
6-24 INCL	± .02	± .010	± 1/32
OVER 24	±	± .015	± 1/16
ANGLES ±1/2°			

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APPROVALS, SIGNATURE & DATE	
DRAWN	JAMES 87/4/29
CHECKED	RB
DWG SUP	Bernard 87/5/1
MECH.	
ELECT.	
MFG.	
Q.A.	
PROJ. APPD.	

KELTEC FLORIDA — A DIVISION OF AMSTAR TECHNICAL PRODUCTS COMPANY, INC.

ASSEMBLY, CABLE

SIZE	CODE IDENT	
C	09062	870225
SCALE 1:1	RW-25-20	SHEET 1 OF 1

KELTEC FLORIDA
Code Ident. 09062

TITLE: ASSEMBLY, CABLE PL870225-9 REV 0
IJR625-20

ITEM NO.	REFERENCE DESIGNATOR	DESCRIPTION	PART OR IDENTIFYING NUMBER	SPECIFICATION OR MANUFACTURER	QTY REQD
1		CABLE, FLAT, 26 CONDUCTOR	3365/26	3M	9"
2		PULL TAB	3490-2	3M	1
3		CONNECTOR, 26 PIN	3399-6026	3M	1
4		CONNECTOR, 24 PIN	3549-1000	3M	1

MP MASTER
MA23126